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51st YEAR

THE COTTON GIN AND OIL MILL

PRESS

FEBRUARY 18, 1950

THE MAGAZINE OF THE COTTON GINNING AND OILSEED PROCESSING INDUSTRIES

FORMERLY THE COTTON AND COTTON OIL PRESS

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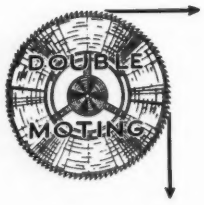
in 1950

KILL 'EM...before they get started!

52ND ANNUAL COTTON INSECT CONTROL ISSUE

80 Years with One Purpose . . .

to Improve Cotton Gin Machinery



See the New Lummus Up-Packing Standard Density Press, with three 9½" Single Acting Rams, Hydraulic Door Latches, Long Stroke Automatic Tramper and High Capacity Totally Enclosed and Permanently Packed Hydraulic Pump.

"YOUR BEST BET IS MULTI-JET".

LUMMUS COTTON GIN CO.

DALLAS, TEXAS **COLUMBUS, GA.** **MEMPHIS, TENN.**

CGC

FINE SAMPLE–CLEAN SEED–LARGE LINT TURNOUT

These three things—all available with CONTINENTAL equipment—mean more money to the cotton grower.

Here are some of the exclusive and outstanding features that may be had in a CONTINENTAL System Ginning Outfit.

(1) Roll Density Indicator with Automatic Control —a standard feature of all combinations of CONTINENTAL Gins and CONTINENTAL Extractors.

(2) Impact Cleaner—no screens that might tend to rope the cotton.

(3) Overhead Bur Machine—that utilizes the entire width of the machine for extraction.

(4) Combination of Overhead Bur Machine with Impact Cleaner—achieves outstanding results in hull and trash separation, gives cleaner bur pile and fine sample, as well as all around trouble-free performance.

(5) Conveyor - Distributor Drier furnished with either Gas or Oil Fired Furnace—a dependable drying system.

(6) PARAGON Up - Packing or SIMPLEX Down-Packing All-Metal Press for gin density bales —and now an Up - Packing Standard Density type of Press can be had.

(7) Lint Cleaning System that now has had two full years of field testing—ask the ginners who have them.

All of these features, and many others, are CONTINENTAL GIN COMPANY'S contribution towards helping the grower get the most out of his efforts towards mechanization.

COMPLETE LITERATURE ON REQUEST.
WRITE OR WIRE OUR NEAREST OFFICE.

CONTINENTAL GIN COMPANY

BIRMINGHAM, ALABAMA

ATLANTA *DALLAS* *MEMPHIS*

Entered as second-class matter February 4, 1905, at the Post Office at Dallas, Texas, Under Act of Congress of March 3, 1897

survey proves preference for meal packed in PAPER bags

Major cottonseed oil mills in Arkansas and Louisiana were included in a recent survey of meal-packing methods. Among other facts, it disclosed that:

Greater output of meal at lower man-hour cost is assured through the one-man St. Regis packaging system.

Farmers, feeders, ginners and dealers prefer meal packed in clean, easy-handling St. Regis Multiwall Paper Bags.

These advantages have led a steadily growing number of mills to use a combination of St. Regis Multiwalls and St. Regis Valve Packing equipment for their meal packaging.

Don't delay in finding out how much *you* would gain in operating efficiency, lower packaging costs and greater customer good will by turning to St. Regis Multiwall Paper Bags *this year*. The nearest St. Regis Sales Office will be glad to give you the facts.

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YOU BUY PROTECTION WHEN YOU BUY MULTIWALLS

KNOW YOUR ENEMIES!

That's the title of the eight-page section, in full colors, showing the major cotton insects (with their life history and injury), which appeared in the Second Annual Cotton Insect Control Issue of THE COTTON GIN AND OIL MILL PRESS last April.

The demand for this booklet was so great that we reprinted 75,000 copies—all of which were gone by the latter part of 1949.

We have just completed a second printing of this booklet. It is an excellent piece of educational material for commercial firms to send to their customers and prospective customers. We have left a blank space at the bottom of the back page so that your name and address can be imprinted — either by us or by your local printer.

Prices for the eight-page, magazine size, full color booklet are: $53 per thousand; $7 per hundred. For imprinting your name: $6 for the first thousand or less—$3 per additional thousand. Prices are f.o.b Dallas.

Order from:

The Cotton Gin and Oil Mill Press

3116 Commerce Street Box 444 Dallas 1, Texas

FIGHT COTTON INSECTS EARLY... GET

MORE COTTON PER ACRE

GREATER YIELDS-LOWER COSTS!

CULTIVATE AND SPRAY IN ONE OPERATION

YELLOW-DEVIL LOW-GALLONAGE SPRAYERS

are fast, economical and easy to operate

(Above) **The cultivator sprayer for early application.**

(Below) **The Model 27 Yellow-Devil.**

SPRAY EARLY WITH KILTONE

THE* KILTONE *WAY

1. **Daylight application—less night work**
2. **Can be applied in moderately windy weather**
3. **Saturates every plant thoroughly**
4. **Sticks and stays where it is put**
5. **More acres per day, more time to spray**
6. **No waste—spray directly on plants**

KILTONE®

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COVER THE EARTH

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AVAILABLE AT DEALERS AND BRANCHES IN COTTON AREAS

TODAY you hear a great deal of talk in the vegetable oil field about Anderson's new EXSOLEX process. Some of it is bound to be inaccurate since EXSOLEX is a new process, and new data on its operation is being assembled every day.

The EXSOLEX process is a combination use of pre-extraction Expellers* and Anderson Solvent Extraction Units to gain greater extraction efficiency. Anderson has a number of EXSOLEX installations and already has valuable data on their operation. More data is constantly being assembled. No other company manufactures equipment for the process or has data concerning EXSOLEX results.

Get the true facts on EXSOLEX as it exists today. If you have an extraction problem involving more than mechanical or solvent extraction, call on us, and we will have an Anderson Engineer give you the true facts relative to EXSOLEX. Your particular operation may be suitable to EXSOLEX methods, or it may best be solved with Expellers or Anderson Solvent Extraction Units. At any rate, you can get correct, first-hand information by writing to The V. D. Anderson Company.

THE V. D. ANDERSON COMPANY
1941 W. 96th Street • Cleveland 2, Ohio

*Exclusive Trade-Mark registered in U. S. Patent Office

ANDERSON

EXPELLERS
SOLVENT EXTRACTION
EXSOLEX

Now THERE'S AN EVANS-BUILT SPRAYER for Cotton

THE FINEST COTTON SPRAY EQUIPMENT EVER BUILT!

NOW AVAILABLE!

Here's how IT COVERS

Adjustable for height and row spacing

EVANS-BUILT and EVANS GUARANTEED...

... to take care of a large acreage of cotton. It will also take care of farm sanitation, livestock, garden and fruit on the family size farm.

1. ACCURATE PRESSURE CONTROL... Pressure range from 10 to 200 lbs. per sq. in. Volume up to 15 gal. per minute.

2. HEAVY DUTY PUMP... proved by actual field testing stands up longer, works better.

3. MAXIMUM STRAINING SURFACE... large capacity screen, over 50 sq. in. straining surface.

4. RUGGED BARREL FRAME... easy to mount. Can be used with or without cultivator.

5. OIL RESISTANT HOSES... used throughout for maximum life.

Designed for use with or without cultivator

and **LOOK AT THE PRICE!**

$122.00

FOB Kansas City
2 Row—2 Nozzle Equipment

Also available in other models for 2-4-6-8 row.

WRITE for your EVANS catalog. If there is no dealer near you, we will ship direct.

Dealers and Distributors Write For Full Details

Evans **ORCHARD SUPPLY COMPANY**
305 DELAWARE KANSAS CITY, MO.

This is one of a series of ads currently running in farm papers throughout the Cotton Belt.

Sell the Sprayer known for DEPENDABILITY

DISTRIBUTORS and DEALERS WANTED

for 25 Years

EVANS ORCHARD SUPPLY CO.
305 Delaware Kansas City, Mo.

Evans Orchard Supply Co.

305 Delaware, Kansas City, Mo.

Dear Sirs:

I am interested in becoming a distributor or dealer for your new Cotton Spray Equipment. Please send me full details.

Name.....

Street Address.....

City.....

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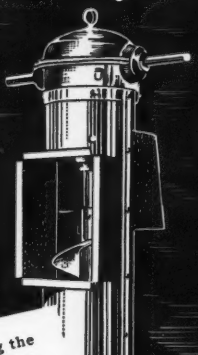
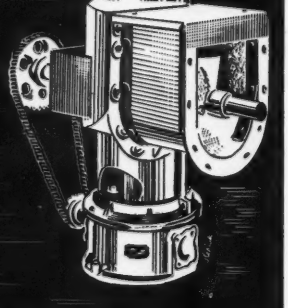
SINCE 1925

Rotor Lift



In considering the elevation of free flowing bulk materials, the name ROTOR LIFT is almost automatically called to mind by engineers, superintendents and management alike. The supremacy of ROTOR LIFTS in the mechanical elevating field is the net result of years of research and experimental work... and many more years of completely successful operation throughout the world. You benefit from this impressive background and record of performance when you specify genuine SOUTHWESTERN 'ROTOR LIFTS.



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THE COTTON GIN AND OIL MILL

PRESS

51st YEAR

THE MAGAZINE OF THE COTTON GINNING AND OILSEED PROCESSING INDUSTRIES

Volume 52 **February 18, 1950** **Number 4**

Published every other Saturday in our own printing plant at 3116 Commerce Street, Dallas 1, Texas

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The Cotton Gin and Oil Mill Press *is the Official Magazine of the foregoing associations for official communications and news releases, but the associations are in no way responsible for the editorial expressions or policies contained herein.*

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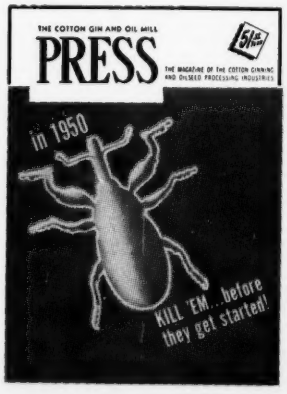
THE COVER

Artist Tom Grimes, who designed the covers for our first two special cotton insect control issues, has developed a healthy respect for the boll weevil and, like the rest of us, regards that pest as cotton's most formidable insect enemy. When we gave Grimes his assignment for this year's cover all we did was to furnish the wording and a photograph of a weevil. To Grimes goes all the credit for the most dramatic piece of art we've seen on the subject of insect control. This year's cover, we think, is far and away his best.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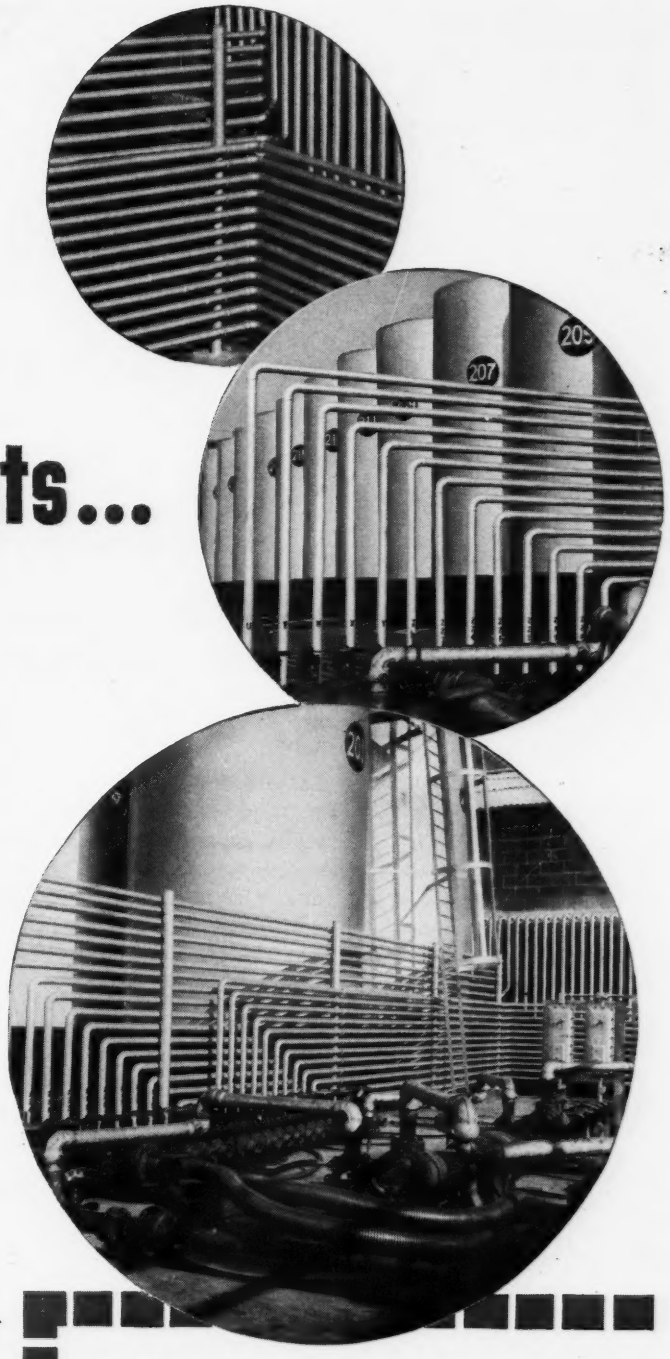
KILL 'EM... before they get started!

READ BY COTTON GINNERS, COTTONSEED CRUSHERS AND OTHER OILSEED PROCESSORS FROM CALIFORNIA TO THE CAROLINAS

VOLUME MISNUMBERED SHO

SHOULD READ VOLUME 51

You get controlled quality with Amsco solvents...



There's a pipe for every storage tank, a pipe for every solvent. That is just one of the painstaking steps Amsco takes to keep your extraction solvent pure and free of contamination.

But Amsco solvents give you more than quality. They give you better results, greater economy, and you get prompt service and delivery wherever you are. You get these and other advantages because for 25 years Amsco has been developing, producing and improving solvents to meet individual requirements.

Here are a few of the other features of Amsco extraction solvents:

- *Amsco's high, fast rate of extraction*
- *Low solvent losses—due to close distillation, high initial boiling point of 150° F. minimum, low dry point of 158° F. maximum*
- *Freedom from objectionable residue and odor*
- *Amsco's "Service that goes beyond the sale"*

We would like to tell you more about our products and services, how they fit your particular requirements. Mail the coupon today!

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Export inquiries invited

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American Mineral Spirits Company, Dept CG-6
230 North Michigan Avenue
Chicago 1, Illinois

Please send information on the complete line of Amsco petroleum-base solvents to:

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Position.....

Company.....

Street Address.....

City.....State.....

(Samples sent on request)

New, More Effective Cotton Poison...NOW AVAILABLE...

ALDRIN*

For Fast, Early Cotton Insect Kill . . .

*Formerly known as Compound No. 118.

Proved More Effective in Increasing Yield

Large scale field tests in the Mississippi Delta area, during the last two years, proved the effectiveness of Aldrin in controlling the **boll weevil, thrip, cutworm, tarnished plant bug,** and **fleahopper.** Aldrin does not cause aphid build up. For thrip and cutworm control, on cotton just up, only 0.07 lb. of Aldrin is required per acre. The effective kill obtained with Aldrin results in greater yield . . . will assist your customers in making up for the cut in allotment quota.

Aldrin is compatible with all new organic insecticides recommended for cotton insect control. For **boll worm** control, a 2½% Aldrin, 5% DDT combination dust at 10 lbs. per acre is recommended.

Aldrin Application before Chopping Cuts Cost... Permits Earlier Harvest.

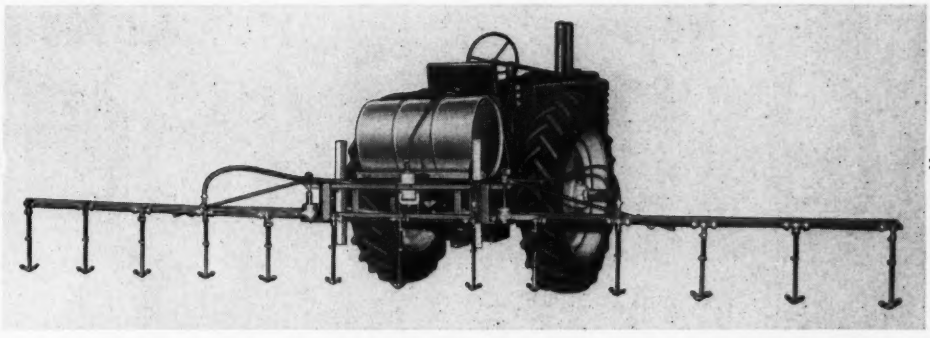
Early application of Aldrin insecticide is recommended . . .

- to protect plants from thrips and cutworms
- to permit harvesting 2 to 3 weeks earlier, ahead of the time when weevils are at their worst
- to reduce the number of insecticide applications
- to allow earlier planting next season.

For *tested* results, sell sprays and dusts containing ALDRIN

Julius **HYMAN** & Company
DENVER, COLORADO

New, effective, economical



MYERS Tractor Mounted Power Sprayer *beats the Cotton Pests*

Because of its many advantages, spraying is now the recommended method for controlling cotton pests. New and effective chemicals do the job economically — and right on schedule. No need to wait for the wind to die down or the dew to collect. You spray any time the crop needs it and keep safely ahead of the pests that threaten your profits.

MYERS Tractor Mounted Power Sprayer is specially designed to meet the cotton farmer's problems. The boom is carried on the axle and drawbar, with the gear-operated pump mounted on the tractor power shaft. This puts the pest fighting chemicals right where they do the most good and can likewise be used to apply defoliants when the cotton is ready to harvest. By simply changing to a different type of nozzles, the same equipment may be employed for weed control in other crops.

The specifications given at the right will show that there is a size of this new MYERS Cotton Sprayer to exactly fit your needs. See your MYERS dealer for complete information; or mail the coupon TODAY.

General Specifications

The Myers Tractor Mounted Cotton Sprayer is built in boom sizes for 2, 4, 6 or 8 rows. Adjustable for rows from 32" to 42". Designed for low pressure spraying, 20 to 100 lbs. Easily mounted on any tractor.

The 4, 6 and 8 row models are equipped with our famous Du-All Boom. The wings of these booms may be folded back for transportation. They are hung on a safety hinge which does much to eliminate accidental breakage. Adjustments are provided for leveling wings. Fittings permit the use of either drop pendants or overhead nozzles.

Spraying pressure is provided by a Tuthill Gear Pump which mounts directly on the tractor power shaft. Pump is equipped with a master shut-off valve, pressure relief valve and pressure gauge.

TAKE OFF YOUR HAT TO **MYERS**
PUMPS • WATER SYSTEMS • SPRAYERS • HAY TOOLS

THE F. E. MYERS & BRO. CO.
Dept. R-185, Ashland, Ohio

You may send free literature on items checked.

( ) Tractor Mounted Cotton Sprayer
( ) Power Sprayers ( ) Hand sprayers

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Address_____

Town_____

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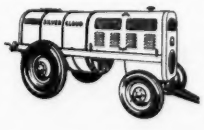
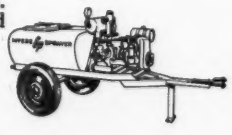


For use with guns or booms

We offer a complete line of Power Sprayers. 2 - wheel, 4 - wheel and skid types.



Pressures from 30 to 800 lbs.

Smaller Field?

HIGHER YIELD!

MORE COTTON PER ACRE THROUGH INSECT CONTROL

Last year showed conclusively how proper application of toxaphene insecticides can increase yield per acre. In 1950, farmers can get more cotton by using toxaphene—the proved poison that kills all common cotton insects.

Leading insecticide manufacturers carry toxaphene dusts and sprays. Place your order now. For free booklet on toxaphene poisons, write:

HERCULES POWDER COMPANY 943 King St., Wilmington 99, Del.

toxaphene

DUSTS SPRAYS

THE CHEMICAL BASE FOR TOXAPHENE INSECTICIDES IS PRODUCED BY HERCULES FROM THE SOUTHERN PINE

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MATERIALS HANDLING!

There's a Continental Conveyor for every industry.

When you have a conveying or elevating problem — — specify

Continental

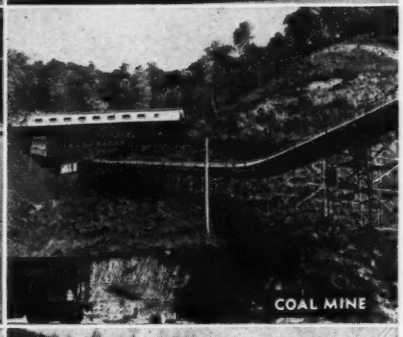
STEAM GENERATING PLANT

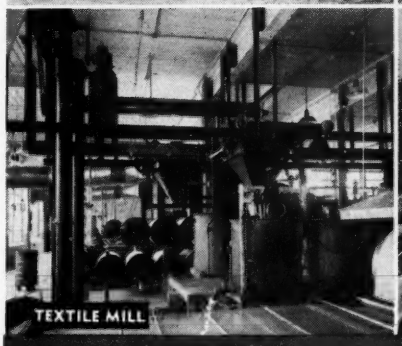
FERTILIZER PLANT

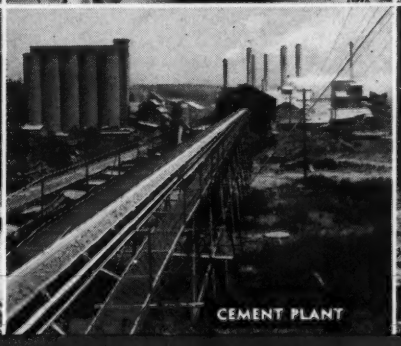
COTTONSEED OIL MILL

GRAIN HANDLING

FEED MILL


COAL MINE


TEXTILE MILL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BELT CONVEYORS, SCREW CONVEYORS, APRON CONVEYORS, BUCKET ELEVATORS
PLATE OR APRON FEEDERS, TRIPPERS, BELT BRUSHES, PULLEYS, SPROCKETS AND CHAIN
PILLOW BLOCKS, BELTING, SPEED REDUCERS, POWER TRANSMISSION EQUIPMENT
FABRICATED STEEL, MEEHANITE CASTINGS, SPECIAL MACHINE WORK

Send us your orders and inquiries.

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CONTINENTAL GIN COMPANY

BIRMINGHAM, ALABAMA

ENGINEERS CGC ATLANTA • DALLAS • MEMPHIS CGC MANUFACTURERS

IT PROTECTS! IT DISINFECTS!

DOW 9-B
SEED PROTECTANT

GROWERS—Whether you purchase cottonseed or plant your own seed, be sure it is treated with Dow 9-B Seed Protectant. Treatment of cottonseed with this effective material helps improve stands and increase yields.

SEED TREATING SERVICE OPERATORS—You will find it profitable to treat cottonseed with Dow 9-B Seed Protectant in your operations. It means effective treatment and satisfied customers.

ACTS TWO WAYS!

1. **It coats each seed with a chemical film, giving protection against fungi which cause pre-emergence damping off.**
2. **It disinfects the seed surface, halting the spread of anthracnose, angular leaf spot, and certain other destructive diseases.**

Dow 9-B Seed Protectant permits earlier planting in cold, damp soil—use of less seed per acre. Seed may be treated with Dow 9-B Seed Protectant and stored for months before planting time without injury. Operators of seed-treating equipment will not be affected when proper precautions are used. Animal poisoning from accidental eating of treated seed is very unlikely.

Thoroughly tested and extensively used by progressive cotton growers and seed treaters. Ask your distributor—or write to Dow for information.

USE DEPENDABLE DOW
AGRICULTURAL CHEMICAL PRODUCTS

WEED AND GRASS KILLERS • INSECTICIDES • FUNGICIDES
SEED PROTECTANT • PLANT GROWTH REGULATORS
GRAIN AND SOIL FUMIGANTS • WOOD PRESERVATIVE

AGRICULTURAL CHEMICAL DIVISION
THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

DOW
CHEMICALS INDISPENSABLE
TO INDUSTRY AND AGRICULTURE

Laugh IT OFF

A young man and his fiancee had wed and were spending their honeymoon at a large hotel. When bedtime came the bride went to bed and the groom sat by the window and gazed at the moon and stars. The bride called him and asked: "Why don't you come to bed?"

Replied he: "My mother told me my wedding night would be the most beautiful night of my life, and I'm not going to miss a minute of it."

• • •

"I'm really an old-fashioned girl."
"Really?"
"Yes, that's all I ever drink."

• • •

The maidenly school teacher had been tempted into taking her first moonlight automobile ride, likewise she had just experienced her first kiss.

School Teacher (wailing): Oh, what have I done? How will I ever face those dear little children with those two black marks against me?

Young Man: What do you mean, two black marks?

School Teacher: Well, aren't you going to kiss me again?

• • •

"Gawdge," another equally unbleached gentleman inquired, "who is dat pouter pigeon gal yonder whut carries herse'f so pertuberant?"

"Why, dat's Miss Iodine Johnsing, fum Memfuss."

"Dogone! She sho' do put on a wonderful front, don't she?"

"Hush yo' mouf, nigger," was the reply. "Dat ain't put on."

• • •

Protect the birds. The dove brings peace and the stork brings tax exemptions.

• • •

A teacher was explaining to the class the difference between "abstract" and "concrete" and was endeavoring to make her explanation very simple and clear.

"Now," she said, "'concrete' is something you can see and 'abstract' is something you cannot see."

Willie looked quite enlightened, so teacher ventured to test her explanation.

"Willie," she said, "give me an explanation of something 'concrete'."

"My pants," was Willie's response.

"Correct," said teacher, gratified, "and now something 'abstract'."

"Yours," said Willie.

• • •

"My wife has the worst memory I ever heard of."

"Forgets everything, eh?"

"No, remembers everything."

• • •

Office Boy: "I et six eggs for breakfast this morning."

Bookkeeper: "You mean ate, don't you?"

Office Boy: "Well, maybe it was eight I et."

Dr. C. M. Meadows

Dr. H. A. Waters

announce the formation of

SOUTHWEST
SPRAYER & CHEMICAL CO.

Waco, Texas

Distributors of

YELLOW DEVIL SPRAYERS

The proven and tested sprayer for control of cotton insects.

District Representative for

SPRAYING SYSTEMS CO.

Precision Spray Nozzles for agriculture and industry.

COTTON SPRAY CONCENTRATES

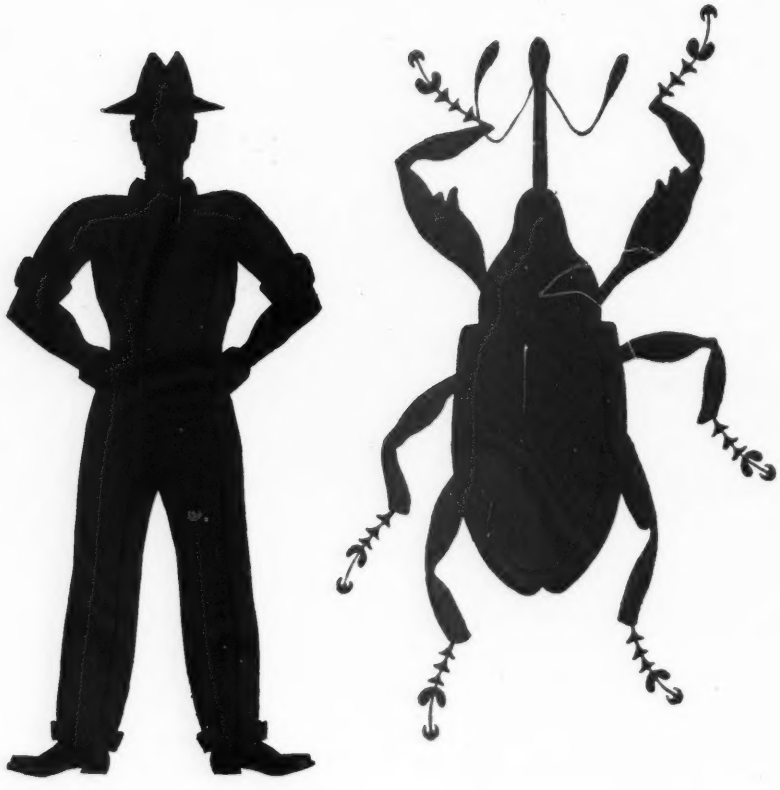
DUST BLENDS AND DUST CONCENTRATES

Consultants and Specialists in Cotton Insect Control

SOUTHWEST
SPRAYER & CHEMICAL CO.

Office and Warehouse:

1410 Jackson St. P. O. Box 487 Phone: 4-4802 Waco, Texas



which one picks more cotton?

Fortunately, the man does. But, each year the boll weevil finds millions of dollars' worth of easy pickings. The loss doesn't just mean fewer yards of textile goods, or pounds of margarine and salad oil. It means thousands less tons of high-protein feed that would have produced more eggs, milk, and meat.

The big job is to wipe out the weevil's take. It's a job for benzene hexachloride—new high-kill insecticide. CSC is producing technical-grade benzene hexachloride of a dry, flake type, all of which is going to manufacturers who grind and formulate insecticides.

CSC's Agricultural Division is working around the clock to make basic, agricultural products for use on American farms.

CSC

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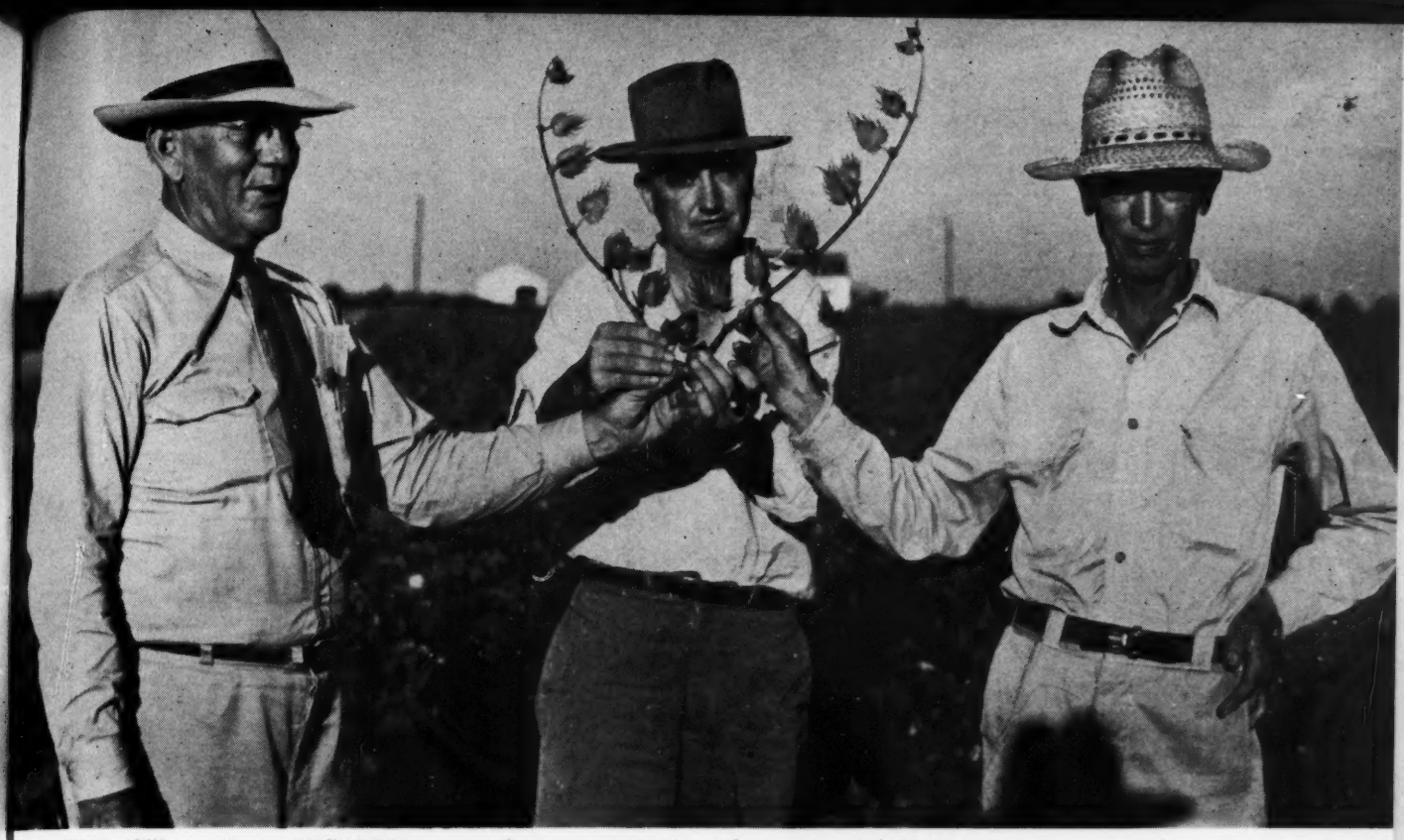

THE "V" stands for VICTORY over early-season insects—when every joint sets a boll, bloom or square on the lower limbs. 3-5-40 dust helped do the trick.

We've lost some battles ... but

WE CAN WHIP INSECTS

We have the weapons . . . we have the knowledge . . . and we have a tried and proved plan of action. If we use them wisely this year we can increase our income from cotton by millions of dollars.

By IVAN J. CAMPBELL
Associate Editor
The Cotton Gin and Oil Mill Press

IN ALL CONFLICTS both sides lose some battles but one usually wins the war. We can't expect to walk off with a victory every time we do battle with cotton insects, but we do have the insecticides, the equipment for applying them, the know-how and a plan of action to effectively control these enemies of cotton.

■ **On a Beltwide basis, the cotton industry took a licking from insects in 1949. They reduced the yield an estimated 13.5 percent, destroying lint and seed valued at $470,110,000, the greatest dollar loss since 1927 when cotton insects ravaged the crop to the tune of more than $550,000,000. The 1949 loss was more than twice the $202,264,000 damage the pests caused in 1948.**

Battles Lost

■ Heaviest toll was taken in the Mid-South and the Southeast. In Mississippi, which last year suffered a loss to insects estimated at $106,510,000, some growers were so hard hit that they may have lost some faith in insect control.

■ In South Carolina, where insects reduced the crop by an estimated 27 percent last year, to the tune of close to $50,000,000, somebody is going to have to work pretty hard to sell insect control to some of the growers that suffered unusually heavy losses.

■ And there were other states that were clouted unmercifully and given a wicked beating by insects in 1949. Consider Arkansas with a $91,660,000 loss, Alabama with a toll of $59,399,000, Georgia which paid tribute to the tune of $40,964,000, and North Carolina's pay-off of $23,901,000 to our insect enemies.

Battles Won

Other states, however won their battles with insects last year and registered relatively light losses to the pests.

■ Texas, for example, had an excellent

WE CAN WHIP INSECTS—because:

1—We have the weapons . . .

New insecticides in dust and spray form . . . good equipment for applying them.

2—We have the knowledge . . .

Years of experience with dusts and a rapidly growing fund of information on the use of sprays.

3—We have a plan of action . . .

Early season control . . . late season control based on infestation . . . early stalk destruction and farm cleanup.

year and showed only a four-percent loss to insects that amounted to a paltry $39,635,000. That seems hardly worth mentioning when you reap a harvest from cotton and cottonseed approaching the one-billion-dollar mark as Texas did.

Texas wasn't the only state that had a good year.

■ Oklahoma suffered only a nine-percent loss against 12 percent in 1948; in Arizona the loss was only one percent against three percent in 1948. In New Mexico the loss was four percent, the same as for 1948.

A better program of insect control and the use of greater quantities of the new insecticides had a lot to do with making these good records possible—but weather conditions contributed something too.

• **No Room for Complacency**—These low losses make a very pretty picture, but it can be terribly misleading when certain facts are considered. *There isn't any room for complacency in those states that had light losses last year.* To those who may have forgotten we would like to post this reminder: *Good cotton years have a way of being followed by bad ones.*

• **1950 Worse Than 1949?**—And if that isn't enough to alert us to dangers that may lie in wait, we would do well to bear this additional fact in mind: *Last fall was favorable for building up a big boll weevil population that went into winter quarters well fed and fat. This could mean even greater losses to insects in 1950 than were suffered last year—even in those hard-hit states east of the Mississippi River.*

■ It could mean that Texas and other states that suffer weevil damage every year, but which had only slight damage in 1949, could find themselves grappling with that pest in a death struggle this summer.

Three Phases of Insect Control

In our war with insects there are three important phases of control that are recognized as being essential in a well-rounded program that results in higher yields of better cotton. They are:

1—Early Season Control

• **What It Does**—Early season control is practiced to insure early fruiting and to kill off cotton pests before they have a chance to build up and damage the crop. It has proved to be a good investment in areas where thrips, aphids, fleahoppers or boll weevils, alone or in combination, cause damage every year.

The Pink Bollworm

■ **CULTURAL PRACTICES including regulated dates for planting and destruction of stalks in the Lower Rio Grande Valley of Texas as specified by the State Department of Agriculture are the most effective means of combating the pink bollworm.**

Dusts containing 2 percent gamma BHC, 10 percent DDT, and 40 percent sulfur at 15 pounds per acre are a supplemental method of control for this insect.

Sprays containing 1½ pounds Toxaphene plus 1½ pounds DDT per acre are also effective.

The Extension Services in states where pink bollworm regulations are in effect urge that these regulations be supported.

Early season control is always more effective if large areas are poisoned.

• **When to Start**—Two or three applications should be made at approximately seven-day intervals, and entomologists are generally agreed that the first application should be made at the usual chopping time, or when cotton is in the four-leaf stage.

In some instances, however, it may be necessary to begin earlier to prevent loss of stand by thirps, aphids, cutworms or other insects.

Where boll weevils cause damage, make two applications for their control. The first application should be made soon after the first squares appear and the second approximately seven days later, or by the time the squares are one-third grown.

• **When to Stop**—Regardless of the number of applications made in an early season control program, the last should be made at least 30 days before bollworms usually appear. This 30-day period is considered vital, so as to allow time for beneficial insects to build up in sufficient numbers to give protection against bollworms.

• **Does It Pay?**—Because early season control is a relatively new phase of the overall insect control program, many still ask if it pays.

The answer is supplied in the reports by K. P. Ewing and C. R. Parencia, Jr., of the Waco, Texas, field station of USDA's Bureau of Entomology and Plant Quarantine. In the April 2, 1949 issue of this publication they reported on highly successful experiments with early season control on a community wide basis in Wharton County, Texas.

In December 1949, Ewing and Parencia reported the results of 1949 experiments in 19 fields on six farms located in the Satin community in Falls County, Texas, and the Bolton Bend community in McLennan County, Texas. Here is what they reported:

"All adjoining fields of cotton in two communities near Waco in central Texas were dusted or sprayed with two early-season applications of one of the new all-purpose insecticides for control of cotton insects. Detailed seasonal records were made in 380 acres, or 19 fields, of early-planted cotton, in order that information might be obtained on maturity of early-treated cotton before bollworms appeared.

"There were heavy infestations of thrips, light to medium infestations of cotton fleahoppers, and medium to heavy infestations of overwintered boll weevils in every field. Rainy weather in June and July was favorable for insect multiplication, especially for weevils.

"The two early-season (about May 31 and June 8) applications of insecticides gave satisfactory seasonal control of the boll weevil in 13 of the 19 fields. The average seasonal infestation was 11 percent in the treated and 42 percent in the untreated cotton. The fields that needed late-season treatment for boll weevils were adjacent to or near untreated fields.

"Two late-season treatments for bollworm control were made in four fields. The increased production from control of the bollworm was only 9.6 percent. In most fields a full crop of cotton was produced before bollworms appeared. *The importance of stopping treatments early enough to give beneficial insects time to build up again is thus emphasized.* This

interval should be four weeks or more.

"There was a seasonal average of four times as many blooms in the treated as in the untreated cotton. The early-season treatments hastened the fruiting and maturity of the cotton by approximately three weeks.

• **Here's Proof**—"The average production of lint cotton per acre in the two communities was 178 pounds from the untreated and 415 pounds from the treated cotton, a gain of 133 percent. The net profit," Ewing and Parencia report, "was $54.42 per acre.

"The low-gallonage, low-pressure sprays gave insect control equal to that given by the dusts. The average yields were 512 and 513 pounds of lint cotton per acre from sprayed and dusted fields, respectively."

2—Late Season Control

• **The Second Phase of an Effective Control Program** — Late season control is used only when inspection counts indicate damaging numbers of insects in cotton. Every farmer should know the identity of these insects and he should be able to make counts to evaluate the damage they cause.

• **Regular Inspection Vital**—Good inspection of fields is not a hit-or-miss affair: they should be inspected constantly —regularly every week or oftener—for signs of insect damage. When damage appears, counts should be made to determine the degree of infestation.

• **Learn to Identify and Make Counts**—Growers who cannot identify cotton insects and make infestation counts should ask their county agent to teach them to do that job.

During the second, or late season phase of control, poisons should be applied at five-day intervals as long as insects are causing damage. *Ginners, cottonseed crushers and farmers should in all cases be guided by their own state recommendations.* If there is any doubt, don't guess —consult your county agent or your state experiment station and follow their recommendations.

NEXT YEAR'S CROP gets a good start when stalks are chopped and turned under green. This field was fertilized and planted in a winter legume cover crop.

3—Early Stalk Destruction and Farm Cleanup

• **The Third Phase**—Early stalk destruction and farm cleanup destroy (1) insect food, (2) host plants and (3) overwintering quarters. Stalk destruction is considered one of the most dependable methods we have of holding down insect damage the following year.

(Continued on Page 39)

We invite your inquiries **for supplies of the following organic insecticides for control of insect pests of cotton:**

3-5-0 Dust

3-5-40 Dust

20% Toxaphene Dust

20-40 Dust (20% Toxaphene + 40% Sulfur)

2.5-5-0 Dust (2.5% Aldrin (118) + 5% DDT)

2.5-5-40 Dust (2.5% Aldrin (118) + 5% DDT + 40% Sulfur)

46% Toxaphene Emulsifiable Concentrate (contains 4 lbs. Technical Toxaphene per gal.)

25% Aldrin (118) Emulsifiable Concentrate (contains 2 lbs. Technical Aldrin per gal.)

25% DDT Emulsifiable Concentrate (contains 2 lbs. Technical DDT per gal.)

11.4% Aldrin (118) + 22.8% DDT Emulsifiable Concentrate (contains 1 lb. Technical Aldrin + 2 lbs. Technical DDT per gal.)

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The State Recommendations

Control of Insects in—

• Alabama

Basically the recommendations for the control of cotton insects in 1950 are the same as those made in 1949. Benzene hexachloride-DDT, 3-5 dust mixture and 20 percent toxaphene, when used throughout the season, have given consistently higher yields than any other dust used extensively against the major cotton pests under Alabama conditions. Dusting early in the season for boll weevil control has not been profitable. The application of insecticides in the form of dusts and sprays during the time the cotton plants were setting and maturing the crop has been most profitable.

Average gains in yield resulting from recommended insecticides applied during July and August exceeded one-half bale per acre in all experiments conducted in four different sections of the state during 1949. In eight of these experiments, gains from insect control during the time the crop was being set and matured exceeded 1,000 pounds of seed cotton per acre over untreated areas.

Insecticides listed below are recommended for control of cotton insects in Alabama in 1950:

Benzene hexachloride-DDT mixture containing three percent gamma isomer and five percent DDT in an inert carrier.

Calcium arsenate alternated with calcium arsenate that contains two percent nicotine or alternated with 3-5 mixture of BHC-DDT.

Toxaphene, 20 percent, in an inert carrier.

Low-gallonage sprays of emulsifiable concentrate of: (1) 40 percent toxaphene applied as the rate of two pounds technical per acre: (2) 40 percent toxaphene and 20 percent DDT applied at the rate of two pounds technical toxaphene and one pound technical DDT per acre.

• **When to Dust Cotton**—The most profitable control of cotton insects results from dusting while the cotton plants are setting and maturing the crop. After the plants are fruiting freely, squares should be examined every week for boll weevil punctures. When 25 or more are punctured out of each 100 examined, it is time to begin dusting. Three applications of dust should be made at five-day intervals. One week following the third dusting, the cotton should be examined again. If the number of squares punctured exceeds 25 in 100 examined, two to three additional dustings should be made at five-day intervals. If there is no evidence of insect damage, no dust should be applied. However, additional weekly inspections should be made until the bolls are mature. If swarming of weevils occurs at any time before the bolls are mature, the cotton should be dusted at four-day intervals until the insects are under control. Very late dustings are often the most profitable of all. It is a grave error to stop dusting several weeks before the bolls are mature on the assumption that there will be no further insect damage. When sprays are used, apply as recommended for dust formulations.

• **Amount of Dust Needed** — If dusting has not been started too early, six to seven applications of dust should be enough for the season. The average rate per application is 10 pounds per acre for toxaphene and BHC-DDT and eight pounds for calcium arsenate.

The amount of dust needed may be increased by frequent rainfall or heavy insect damage. If an application of calcium arsenate is washed off within 24 hours, the dusting should be repeated. Results to date indicate that applications of BHC-DDT or toxaphene need not be repeated if the insecticide remains on the cotton 12 to 15 hours without rain. The BHC-DDT mixture kills many weevils within four to six hours after dusting. For best results apply dust during late afternoon.

(For additional information, write W. A. Ruffin, Entomologist, Extension Service; or F. S. Arant, Entomologist, Agricultural Experiment Station, Auburn, Ala.)

Control of Insects in—

• Arizona

Practice Good Farming

Always prepare a good seed bed.

Plant as early as possible.

Follow recommended irrigation practices.

Set up a plan for adequate insect control.

We must stress that the control of insects in cotton by new insecticides has proved to be very important. This is reflected by increased yields and better quality of cotton. The control of insects alone will not give high yield or good quality, nor will following good farming practices. It takes a combination of good farming practices and insect control to give the desired results.

Learn to recognize injurious cotton insects and use a bug net at several points in a field to determine if insects are present in harmful numbers. Do not dust or spray as a preventative measure or just because your neighbor dusts or sprays.

Injurious Cotton Insects of Arizona and Controls Based on Research Conducted by the Bureau of Entomology and Plant Quarantine, Division of Cotton Insects

• **Beet Armyworm**—A chewing insect—The beet armyworm may be the first insect to harm your cotton. This insect feeds on the cotton plant when it is in the seedling stage and in some instances may destroy the crop. It is not injurious every year, as parasites usually keep it under control. Some seasons it may injure squares late in the season. A dust mixture of five percent DDT and 75 percent conditioned sulfur will give good control. It will give good control when applied at the rate of 15 pounds per acre. If a spray is used, be certain to apply ¾ pound of DDT per acre.

• **Darkling Beetle** — Chewing insect—

IT SHOULD be remembered that insect control recommendations are not the same for all states. For example, in some states the boll weevil is a severe menace every year; damage by this pest is moderate in other states; and in a few the boll weevil is not present at all. It is necessary, therefore, that ginners and cottonseed crushers familiarize themselves with the recommendations for their own state and not become confused because they may differ from the recommendations of other states. Never guess . . . if you have questions about proper control measures in your state consult your county agent or Experiment Station.

This is a minor pest; however, some seasons it may be very injurious, especially following alfalfa or in sandy soils. Control for this insect is poison baits or irrigation for long periods after sproutingtime. Ten percent DDT and 75 percent 325 mesh conditioned sulfur mixture applied at the rate of 15 pounds per acre, by ground machinery, gives good control.

• **Lygus Bugs, Creontiades Femoralis**—(western cotton plant bug), stink bugs, superb plant bug and cotton fleahoppers are our most important cotton insects in Arizona. All of these insects have suckling mouthparts. All of them feed on squares or bolls of the cotton plant. The stink bugs and Creontiades cause more injury to cotton bolls and stain the lint. A five percent DDT and 75 percent conditioned sulfur will control all these insects except the stink bug and generally speaking ten percent DDT sulfur is better for control of the cotton bollworm. A 10 percent DDT and 50-60 percent dusting sulfur applied at the rate of 15 pounds per acre may be cheaper and may give better control of the sucking and chewing insects. Research work also shows a 20 percent chlorinated camphene and at least 40 percent 325 mesh conditioned sulfur to be effective when applied at the rate of 15 pounds per acre per application.

A five percent DDT, two percent gamma isomer benzene hexachloride and 50 percent 325 mesh conditioned sulfur will give best control of stink bugs when applied at the rate of 15 pounds per acre per application. If a spray is used, you must be certain to apply not less than four-tenths of a pound of gamma benzene hexachloride per acre.

• **Aphids or Cotton Lice**—Sucking insect—Aphids sometimes cause serious injury to cotton in all stages of growth. The worst injury is caused by their presence on plants when cotton bolls are open. The "honey-dew" that they excrete injures the quality of the lint. Benzene hexachloride at the rate of one-half pound of the gamma isomer per acre gives a "knockout" of the aphids.

• **Cotton Bollworm** — Chewing insect—The cotton bollworm feeds on both squares and bolls of the cotton plant. The bollworm must be controlled when it first appears. A 10 percent DDT and 50 to 60 percent 325 mesh conditioned sulfur should be applied at the rate of 15 pounds per acre.

• **Cotton Leaf Perforator** — A chewing insect—This insect causes the greatest injury to stub cotton; however, it may become injurious to planted cotton. Due to its habits of feeding only short periods, it is difficult to control. A five percent DDT and a 325 mesh conditioned sulfur will give good results.

• **Red Spiders or Mites**—Red spiders or mites may appear in some fields in great numbers. If such an infestation does develop, an application of 325 mesh conditioned sulfur should be used at the rate of 20 to 25 pounds per acre. One application should give good control. There are some spider mites that are resistant to sulfur and if these appear, recommendations will come out in the weekly cotton insect report.

• **Salt Marsh Caterpillar**—The salt marsh caterpillar, also known as the wooly worm, may cause some injury to cotton. All stages of this worm may be controlled with a dust mixture of 15 percent chlorinated camphene, five percent DDT and 40 percent 325 mesh conditioned sulfur. Apply at the rate of 15 pounds per acre per application. Toxaphene emulsion applied at the rate of three pounds of toxaphene per acre has also looked very effective for control of this insect.

Suggestions on Insecticides and When to Apply

Dust applications should be started when six to eight sucking insects per 100 are found in sweepings of a bug net over the tops of the plants, made at several different points in the field.

Experimental work indicates a dust mixture of five percent DDT, two percent gamma isomer benzene hexachloride and 50 percent mesh conditioned sulfur to be the best materials for control of stink bugs. This material should be applied at approximately 15 pounds per acre per application.

The above material will also kill the aphids if they are present. In fact, this dust mixture will control all of the insects that infest the cotton fields except the salt marsh caterpillar.

A number of other insecticidal formulations, including chlorinated camphene, have given good results.

Research work with the new organic insecticides as sprays have shown that sucking insects can be successfully controlled, but these data up to the present time are not sufficient to warrant their recommendation for control of bollworms, aphids and leaf perforators.

Endeavor to apply insecticides when weather conditions are favorable.

It is suggested by the Extension Service and crop dusters that a better job can be done if the farmer will furnish good flagmen. Also have a prearranged set of signals for both flagman and pilot to use in case weather conditions necessitate a change in dusting. Good dusting companies know best poundage and best conditions for applying materials.

If salt marsh caterpillars should appear in August, it is advisable that you control them with the recommended insecticides at once.

See your county agent if in doubt.

(For additional information, write J. N. Roney, Entomologist, Agricultural Extension Service, University of Arizona, Tucson, Arizona.)

Dusting Paid Big Dividend Here

TWO APPLICATIONS of 20 percent Toxaphene dust applied at the rate of 10 pounds per acre were responsible for the many big, early-maturing bolls shown here. First application was made soon after the first forms appeared and the second 7 days later. Over-wintering weevils were killed before they had a chance to damage the crop.

Control of Insects in—

• Arkansas

Applying insecticides for control of cotton insects should be undertaken only where it is known that an active infestation occurs. Knowing the degree of infestation in a given field requires taking and evaluating of infestation records. This is the most important step in cotton insect control. Applying insecticides where the insects controlled do not occur is not only a useless item of expense but is dangerous since it may upset the biological balance and induce an outbreak of some pest which the material used will not control.

Where early, small local infestations of the boll weevil occur, as is often a rule in the northern half of the Delta, spot dusting will be recommended, and insecticides applied on fields or cuts when injury threatens.

The insecticides recommended for weevil control will be a choice of calcium arsenate, the 3-5-40 mixture, or 20 percent toxaphene. The organic insecticides should be applied at the rate of 10 pounds or more to the acre; calcium arsenate at seven to 10 pounds to the acre. Where calcium arsenate is used two percent nicotine should be included in alternate applications to prevent aphid build-up, or, it should be alternated with 3-5-40 in every second or third application. A 10 percent DDT dust will be recommended for control of the bollworm when eggs or four or five worms are found in 100 terminals. Sulfur included in mixtures of the organic insecticides tends to repress outbreaks of red spider. Sulfur is also recommended for control of the flea hopper, and may be applied either alone, or if weevils are present, with other insecticides. Calcium arsenate is still first choice for the control of the cotton leafworm.

These recommendations are essentially the same as for 1949. Undoubtedly there will be extensive grower trials of liquid spray concentrate formulations. Other recommended changes in materials until more knowledge regarding toxicity is available seem to be farther away.

(For additional information, write Dwight Isley, Entomologist, College of Agriculture, or Charles G. Lincoln, Entomologist, Extension Service, University of Arkansas, Fayetteville, Ark.)

Control of Insects in—

• California

The cotton grower is advised to use insecticides only when they are certainly needed. He is advised not to use them as insurance against insect infestations.

The following list of the more common insect pests of California cotton are those which have been most economically controlled with DDT-sulfur dust.

• **On Young Cotton** — The beet armyworm, cutworms, small darkling beetles.

• **During the Fruiting Period** — Lygus bugs, fleahoppers, the bollworm (corn earworm), the bean thrips, the yellow-striped armyworm.

One pound of DDT per acre (with 15 or more pounds per acre of sulfur for control of red spider mites) in each application is the average amount required to obtain good control. On young cotton and with good row-crop dusting equipment, it requires some less than this but for large plants dusted by aircraft, not less than 1½ pounds of DDT can be safely recommended. A DDT-sulfur dust containing 10 percent DDT and 70-80 percent sulfur applied at the rate of 10 pounds per acre will give one pound of actual DDT per acre at less cost than one containing five percent DDT at 20 pounds per acre. With the former poundage and the dusting equipment available at present, the plant coverage will not be as good, and a maximum of only eight pounds of sulfur per acre would be applied. A dust containing less than five percent DDT increases the cost of dust and the application. The average cost of applying 30 pounds of dust per acre by aircraft is $1.50, and one should not expect much, if any, reduction in the application cost if 15 pounds per acre were applied instead of 30.

For most of our cotton insects with the exception of the bollworm, the application of one pound of actual DDT per acre will prevent a reinfestation for one month. The interval between applications of DDT for control of the bollworm is close to two-three weeks from about late July into early September.

The bean thrips is usually a serious pest in the west and northwest part of the San Joaquin Valley where Lygus bugs are the least serious and, therefore, a mid-July application is usually the most timely there. In the south and southeast part of the San Joaquin Valley where Lygus bugs are serious pests, two applications, one near the first of July and another a month later, are the

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HERE are the products that proved their value over and over again in 1949. You can count on them again this year to produce extra profits and real customer satisfaction for you. Write today for complete catalog and price list of Thompson-Hayward Farm-Tested Cotton Poisons.

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most timely ones, but should be timed to *follow* the cutting of nearby alfalfa or harvesting of potatoes by not more than one week.

Lygus bugs or "cotton daubers" are attracted to succulent or rank-growing cotton. The current changes in the cultural practices due to the mechanization and to the new variety Acala 4-42 may advance the timing of insecticide applications for control of Lygus bugs and other insects. This insect feeds only on squares and small bolls which it may cause either to fall from the plant or remain on it and develop into deformed flowers and bolls. This injury produces an increase in the growth of leaves and stems but few, if any, bolls are produced.

Similar types of injury are produced by: an excess of nitrogen, particularly with an excess of water; the stress caused by long intervals between irrigations or a like effect due to soil type and water penetration; deep cultivations which destroy surface roots.

When an average of five percent of the white blossoms have petals which show the crinkled and warty surface and the brown spots on the inner floral parts, the infestation is sufficiently heavy for control measures to be taken. Control measures should be taken when a 14-inch diameter insect net properly swung 50 times through the tops of one row collects an average of six young and adult Lygus bugs.

The bollworm or corn earworm has been a more serious pest of cotton during the past few years. Certain localities have had this insect pest fairly consistently for several years but now it is not uncommon for it to occur in any part of the San Joaquin Valley. The buff colored moth lays 500-3,000 eggs at dusk on the tips of new growth which have no insecticide on them if the application was made only a few days previous to this time. By the time the worms hatch and feed on the tiny squares in the tips, any insecticide has rapidly weathered off the plant. Heavy infestations in the tips may show up two weeks after an application of DDT. DDT is much more effective pound for pound than any of the other insecticides. If an average of four-five of these small worms can be found by examining 100 terminals, DDT should be applied. The worms proceed down the plant attacking many bolls which are completely destroyed either by the worm or by fungus which follows their attack. The full-grown worms burrow into the soil and transform into a moth that starts laying eggs about two weeks after the worm stopped feeding. Some of the insecticides which are especially destructive of the beneficial insects have given increases in the infestations of bollworms. Until more investigation of this particular problem is done, it seems advisable to warn against the use of any other insecticide than DDT for the control of it.

During the past three seasons insecticides applied in concentrated form with water as the diluent and applied at either five or 10 gallons per acre were DDT, toxaphene, chlordane, TEP and BHC. These were applied by fixed wing planes with booms or brushes, helicopter with boom, and some with row-crop spray equipment. The results have been very comparable to those where the same amount of insecticide was applied in dust mixtures, but no satisfactory material to use in this concentrate for control of the red spider mite, *Tetranychus atlanticus* McG., "Atlantic mite," has been found. The amount of sulfur required is too bulky to be kept in suspension by the aircraft equipment. TEP (tetra ethyl pyrophosphate) in dusts and sprays and one and two percent parathion in dust have not given satisfactory control. The two-spotted mite, *T. bimaculatus* Harvey, is occasionally found on cotton and is not controlled by sulfur dust. This mite is the most difficult to control of the three species common on cotton in California. No chemical has given satisfactory control to date. The injury of leaves is intermediate between the smaller dense colonies of the Atlantic mite and the uniformly scattered and heavily webbed character of the pacific mite. The pacific mite is blown into the tops of cotton plants from deciduous trees and vines in mid-season and causes a grayish appearance due to webbing and injury. One percent parathion dust has given good control of the pacific species on cotton.

California Recommendations For Insect Control

Insect	Recommended Insecticide	Time of Application or Injury	Rate of Application or Remarks
Beet armyworm, Cutworms, Small darkling beetles	5% DDT, 70-80% sulfur dust	Young cotton (seedlings)	10-20 pounds per acre depending on the ground equipment.
False wireworms Seed-corn maggot Wireworms	None certain	Young cotton (seedlings)	
Hornworms, larvae of white-lined sphinx moths	5% DDT or 10% Toxaphene dust	Young cotton (seedlings)	As barriers or on plants, applied by ground equipment.
Thrips: onion and western flower Cowpea aphid ("black aphid")	None	Young cotton (seedlings)	Insecticides that kill these insects require too frequent applications to be practicable. Toxaphene, 2 pounds actual per acre has been the most promising. Airplane spraying better than dusting.
Lygus bugs Fleahoppers	5% DDT, 70-80% sulfur dust	June to about Aug. 15	20 pounds per acre by ground equipment, 30 pounds per acre by airplane.
Yellow-striped armyworm	5% DDT, 70-80% sulfur dust	About July 15 to Sept. 1	20 pounds per acre by ground equipment. Border strips to protect against migrations.
Bollworm Bean thrips	5% DDT, 70-80% sulfur dust	Throughout season but usually July through Sept.	25 pounds by ground equipment, 35 pounds by airplane.
Red spider mites: Atlantic mite	Sulfur dust	Very common throughout the season	10-40 pounds per acre depending on equipment and size of plants.
Pacific mite	1% parathion 70-90% sulfur dust	Occasional in mid to late season	10-40 pounds per acre depending on temperature, equipment and size of plants. Two applications four days apart if max. temperatures average 95° F or above.
Two-spotted mite	None certain	Occasional, mid to late season	New chemicals show only fair results.
Cotton aphid	No. 10 nicotine dust or 1% parathion 70-90% sulfur dust	Occasional June to Oct.	10-40 pounds per acre depending on equipment and size of plants. Nicotine sprays by airplane show promise.

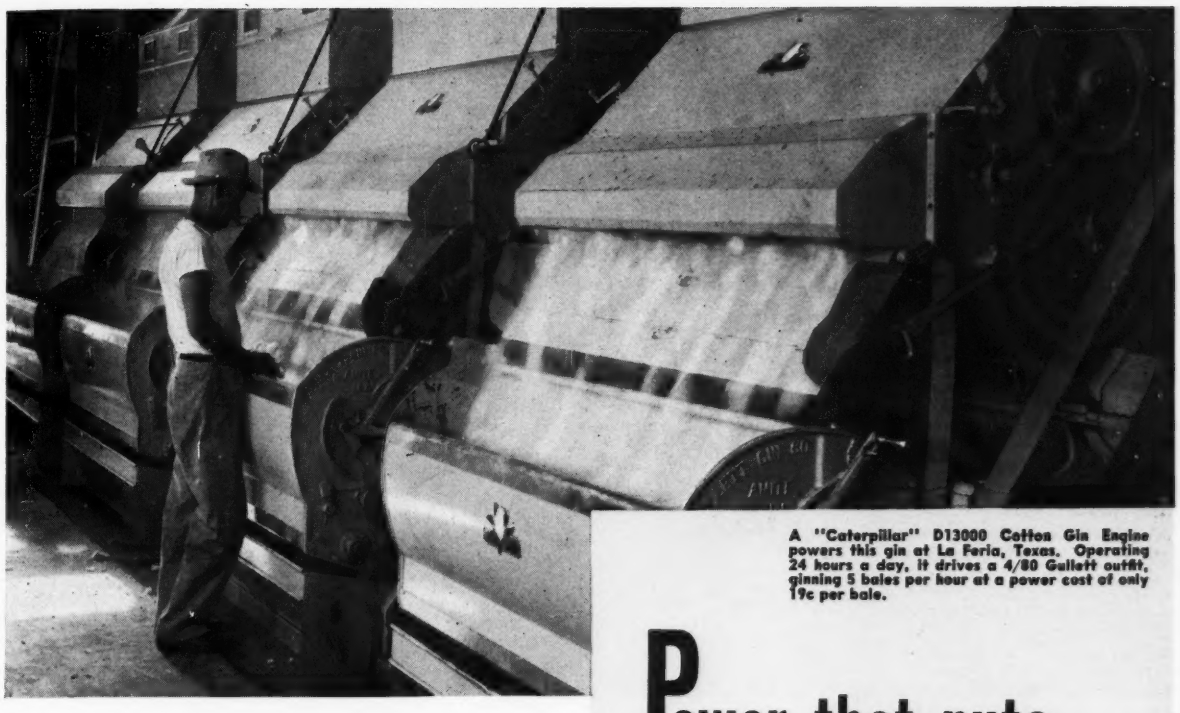
The following insecticides are compatible one with another and may be used together in dust or spray combinations: DDT, toxaphene, chlordane, benzene hexachloride (BHC), parathion, sulfur. They are not compatible with lime-sulfur or other strongly alkaline materials. Combinations of these have not shown good results on cotton except for the combination of sulfur with one of the others, as previously shown in this article. The emulsifiables and the wettable powders have the correct amount of wetting agents in them and none of these additives should be used unless the package label specifies one. The combination of phosphate insecticides with oil sometimes results in plant injury and is more apt to be absorbed through the skin of those who handle them. For most insects on plants, oils are not recommended with the insecticides mentioned above.

Parathion is highly toxic to warm-blooded animals. This insecticide can be handled safely only if all precautions are observed. Preventative measures include the use of a suitable respirator (Mine Safety Appliances Co., parathion respirator No. CR 49290) to avoid inhalation of these chemicals and the use of impervious gloves to prevent contact with the bare skin. Workers should change their clothes completely and bathe with soap and water after using the materials or if clothes become soaked. Any operators handling parathion or its formulations and developing symptoms of headache, shortness of breath, tightness of the chest, pinpoint pupils, giddiness, nausea, diarrhea or related symptoms should be seen by a physician *at once.*

Injury has occurred on cotton by airplane spraying with the emulsifiable insecticides when temperatures were around 90° F. and above. The same combinations applied at lower temperatures, evening and early morning, did not burn the foliage.

Applying insecticides for the control of thrips and the cowpea aphid on young cotton has so rarely shown any benefit that the cotton grower is advised against it. Concentrated emulsion applied by airplane at the rate of five gallons of spray, containing two pounds of actual toxaphene, per acre has given the best results to date. This application is also effective for control of salt marsh caterpillars but chemical control of it is not recommended due to the generally spotty infestations.

The cotton aphid may seriously stunt



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plants and reduce yields. It often becomes so numerous near harvest time that the honeydew on fiber interferes with both machine and handpicking. It also interferes with ginning and reduces the quality. Insecticides which give satisfactory aphid control are expensive. Infestations may often be kept from becoming widespread by spot dusting in the early season. Nicotine dust, No. 10, gives good results in warm, quiet weather. One-half and one percent parathion in prophyllite and the same percents with sulfur have all given good control of the cotton aphid on cotton. Because the one percent parathion has been tested more thoroughly than the half percent, it is recommended and with 70 percent or more sulfur. The experimental work of including aphicides in mixtures used for control of other insects in July and August has shown no benefit in preventing the September aphid infestations. Nicotine sprays applied by airplane gave promising results in 1949. Toxaphene was too uncertain to recommend for aphids.

The recommendations for the control of cotton insects in California are necessarily different from those of the Cotton Belt states. The following are some of the reasons why:

1. The 3-5-40 mixture frequently mentioned in the cotton literature consists of three percent gamma of BHC, five percent DDT and 40 percent sulfur. The BHC is included for the control of the boll weevil and leafworm which do not occur in California.

2. The summer rains in the Cotton Belt states and the short residual effect of BHC require more frequent applications than are needed in California.

3. The rains reduce the spider-mite problem there, and with the frequent applications of a dust containing 40 percent sulfur they control the spider mites.

4. The cost of a dust mixture is considerably increased by the addition of another insecticide.

(For additional information, write Gordon L. Smith or Douglas E. Bryan, Division of Entomology and Parasitology, University of California, Berkeley 4, California.)

Control of Insects in—

• Georgia

I. Dust Materials and Amounts Recommended for Boll Weevil Control

(1) **BHC - DDT** — A mixture containing three percent gamma isomer of benzene hexachloride and five percent DDT (3-5 mixture). Use at the rate of at least 10 pounds per acre all applications.

(2) **Calcium Arsenate** in alternate applications with **BHC - DDT** (3-5 mixture). Use calcium arsenate at the rate of seven to 10 pounds per acre. Apply BHC-DDT at 10 pounds per acre.

(3) **Toxaphene** — A dust containing 20 percent technical toxaphene. Use at least 10 pounds per acre all applications.

Any of the above insecticide mixtures will control boll weevils, bollworms, aphids, fleahoppers and cotton leafworms if properly applied. In unusually large or rank growth cotton the recommended number of pounds should be increased.

In areas where red spiders are prevalent the BHC-DDT and toxaphene dusts should contain 40 percent sulfur. In other areas use any other suitable neutral or slightly acid diluent.

II. Method and Time of Applications for Boll Weevil Control

Method—hand guns, horse-drawn, and tractor operated dusters or airplane dusting are all satisfactory if well done.

Time—(1) **Pre square:** Early poisoning is recommended where boll weevils, thrips or fleahoppers are numerous early in the season. At this time the BHC-DDT or toxaphene dusts may be used.

(2) **After Squaring Begins:** When squaring begins examine the fields. If punctured or flared squares are readily found, apply any of the recommended materials. In most years the normal dusting schedule commences with this application. Applications should be made at four to six day intervals until the infestation is brought under control. This will probably require at least three applications. Fields should be watched closely and poisoning resumed when reinfestation occurs. Presence of insects and weather conditions will determine the total number of applications during the season. *Do not stop too early.* Late applications are particularly important for control of bollworms. Any application of toxaphene or calcium arsenate washed off within 24 hours is not effective and should be repeated. BHC-DDT is considered effective if on the cotton for 12 hours.

III. Sprays for Boll Weevil Control

A. Spray applications of the organic insecticides have been tested only one year under Georgia conditions. Results to date have compared very favorably with dust applications of the same materials. Sufficient experimental data are not available to justify making a general recommendation for sprays during 1950. For farmers who may consider using sprays, the following information is given. Because of mechanical difficulties which may result from poorly formulated emulsion concentrates, only materials furnished by reputable and well known firms should be used. Applications should be made with emulsion concentrates diluted as recommended by the manufacturer and using the low-gallonage and low-pressure spray equipment.

Materials that have been tested are (1) toxaphene, using a 40 percent emulsion prepared for spraying and (2) toxaphene-DDT in the proportion of four pounds technical toxaphene—two pounds technical DDT per gallon of high concentrated emulsion. Dosages of the material are recommended at from five to 10 gallons of spray (equivalent to two pounds technical toxaphene per acre) depending upon the size or growth of the cotton plant. Sprays should be applied only when the plants are dry. As a safety measure to the operator, it is recommended that the spray booms be mounted on the rear of the tractor. Place the nozzles six to eight inches from the cotton plant. For effective coverage, the nozzles should not drag in the cotton plants.

IV. B. Bollworm Control

As soon as squares with small holes in them are found apply either BHC-DDT, toxaphene or 10 percent DDT dust, at the rate of at least 15 pounds per acre.

C. Red Spider Control

One or more applications of 15 to 20 pounds of dusting sulfur per acre should be used in case of a build-up of this pest. In areas where red spiders are prevalent, the BHC-DDT and toxaphene dusts should contain 40 percent sulfur.

V. General

1. Results using chlordane have been erratic. It is not recommended except in

(Continued on Page 46)

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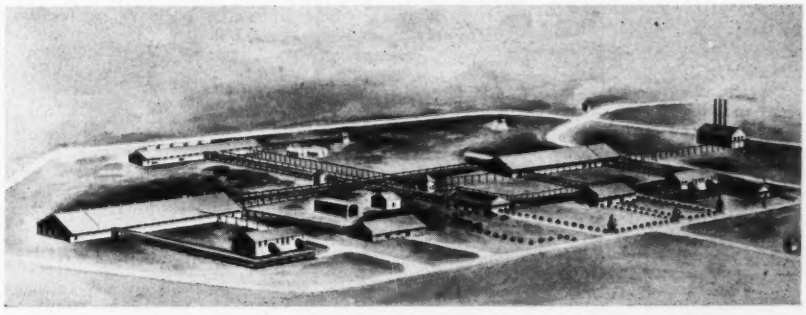

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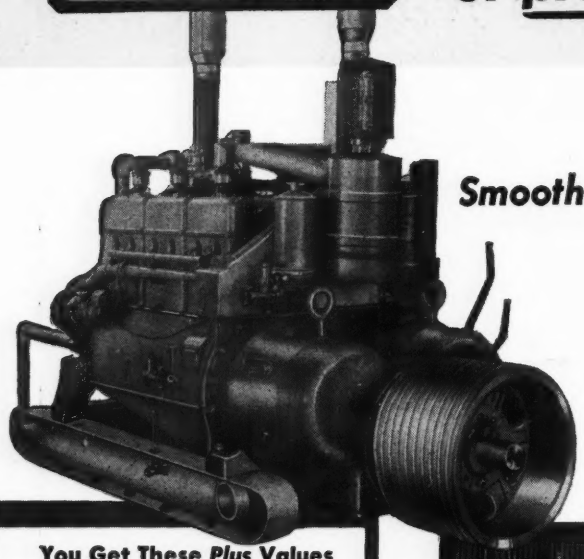

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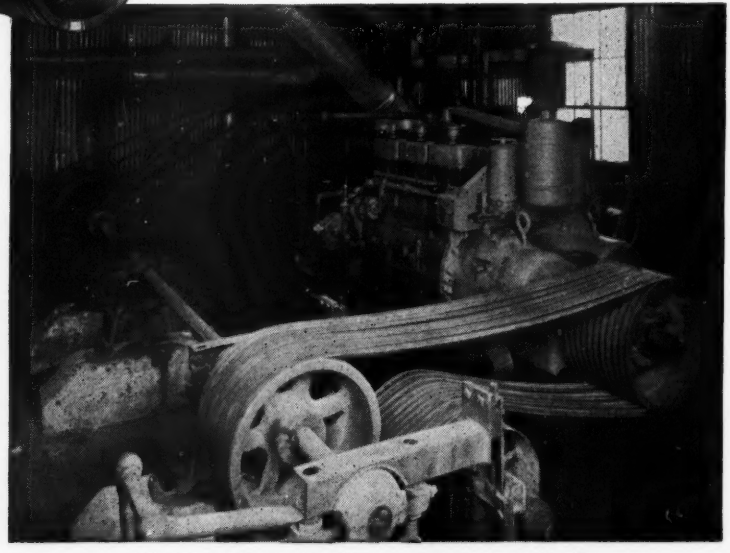

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Developments in Cotton Insect Control

By Dr. P. N. ANNAND
Chief, Bureau of Entomology and Plant Quarantine
U. S. Department of Agriculture, Washington, D. C.

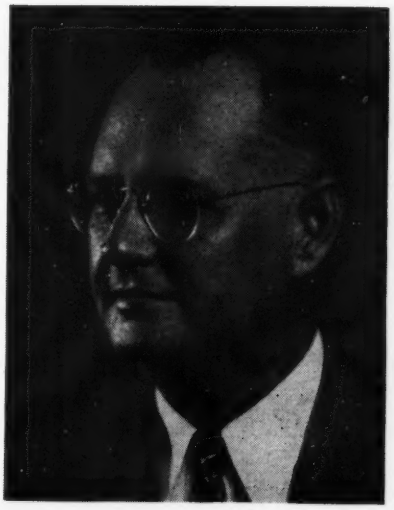
A KNOWLEDGE of the insect enemies of cotton and an appreciation of the importance of controlling them is essential to everyone concerned with the production of the cotton crop.

By this, I don't mean that every cotton ginner and every cottonseed crusher, for example, need know all that is to be known about each of the 100 or more kinds of insects that attack cotton in this country. He should, however, have an appreciation of the enormous losses these pests are capable of inflicting upon the industry, keep in touch with their distribution and abundance from year to year and have a general knowledge of the latest methods and materials available for reducing or preventing losses from those pests that occur in his area.

• **Ginners and Crushers in Strategic Position**—Such an understanding on the part of the ginner or cottonseed crusher is essential because of his strategic relationship to the cotton growers. He can do much to help persuade the growers that it is profitable to control insect pests and can urge that they consult the most reliable sources of information for the best control practices to use under local conditions. His efforts along this line will aid appreciably in bringing about the production of many more bales of high quality cotton and tons of cottonseed for the benefit of the entire industry.

The year 1949 will long be remembered by cotton growers and others in many parts of the South as a year of unusually heavy infestations of the boll weevil. When the state and federal workers concerned with cotton insect research and control met at Jackson, Miss., last November, representatives from many states reported that the weevils had been more abundant in the cotton fields of their areas than at any time during the past 20 or more years. The reports indicated that serious infestations occurred in nearly all counties where cotton is grown in Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi and Louisiana. Weevils were also very abundant in the cotton-growing counties in the eastern half of Texas, in all counties of Oklahoma except a few in the extreme western part of the state, and probably in all counties of Arkansas except Mississippi county. Infestations reached nearly all of the cotton-growing counties of Tennessee. Conditions were very favorable for weevil development throughout the season and the insect was abundant in many northern cotton-growing sections where it only occasionally occurs in destructive numbers.

The bollworm caused considerable damage to cotton last year in some areas, but in general the damage caused by this and pests other than the boll weevil was less than usual.



DR. P. N. ANNAND

• **$470 Million Loss in 1949**—Official estimates concerning the reduction from full yield caused to the 1949 cotton crop by insects are not yet available. Preliminary, unofficial estimates have been published by the National Cotton Council of America in the Jan. 1, 1950, issue of their *Progress Bulletin*. According to these estimates, which were based on the indicated yield as of Oct. 1, 1949, insect pests destroyed approximately 2,811,000 bales, or more than one-seventh of the crop. Based on an average price of 30 cents per pound, these estimates placed the lint losses at $421,650,000. Losses to cottonseed were estimated at some 1,127,000 tons with a value of $48,460,000. The total loss to cotton and cottonseed from the boll weevil and other pests, based on these estimates, was placed at $470,110,000.

• **Good Control Measures Were Profitable**—Despite the unusual abundance of the boll weevil, some growers in practically every county produced satisfactory yields of good quality cotton in 1949. These were the growers who, through intelligent use of the recommended practices, determined the insect situation in their fields and applied the necessary control measures at the proper time whenever such were needed. There were many others, however, who failed to employ sound, practical measures to protect their crops and in consequence suffered serious loss.

• **More Education Needed** — Extensive research by state and federal workers over many years has produced various methods that have been proven commercially practical and effective for preventing or reducing the damage caused by cotton insects. These include various cultural methods or good farming practices, as well as the application of insecticides. But research, or the entomologists alone, cannot solve the problem. Altogether too few cotton growers yet realize the economic importance of carefully following the recommended practical measures to protect their crop from the many insect enemies which make such serious inroads on yield and quality. One of the biggest jobs now facing us is to find a way of getting more growers to take advantage of the control measures available to them.

• **Need for Placing Orders Early**—The 1949 season saw large quantities of the new organic insecticides used for the control of insect pests on cotton. The demand for them greatly exceeded the supply in some areas. This situation was due in part to considerable uncertainty as to just what materials would be chiefly used by cotton growers last year. The placing of orders was delayed all along the line from the grower through the dealer to the manufacturer. This resulted in creating local shortages of the particular insecticides growers wished to use in some instances, due to the amount of time needed to assemble the basic chemicals and to blend, formulate and distribute the insecticides to the areas where they were desired. This was particularly true with regard to supplies of the new organic insecticides, but also had some effect on the early production of supplies of calcium arsenate. There were, of course, other factors which had a bearing on local shortages of insecticides. However, thanks to the excellent cooperation on the part of entomologists, extension workers, insecticide manufacturers, distributors and others, local needs were determined and the de-

"ALTOGETHER too few cotton growers yet realize the economic importance of carefully following the recommended practical measures to protect their crop from the many insect enemies which make such serious inroads on yield and quality. One of the biggest jobs facing us is to find a way of getting more growers to take advantage of the control measures available to them."—THE AUTHOR.

mands met, to a considerable extent. Of course, many instances occurred where growers were unable to obtain the particular material or materials they preferred and they frequently were not able to get an insecticide supply at just the time it was desired or needed. Considerable quantities of materials were moved from certain areas to others where more critical needs occurred, and in most areas the growers were apparently able to obtain some kind of material within a reasonable period of time. The situation which occurred last year emphasizes the necessity of placing orders for control materials well in advance of needs. Cotton ginners and crushers can aid by stressing the importance of this to the growers in their areas.

• **Hazards Must Not Be Overlooked**—Insecticides play an extremely important part in the control of cotton insects and the usefulness of many of the newer organic materials was well demonstrated last year. Where insect pests are abundant, insecticides are essential to the profitable production of cotton. However, the fact that there are hazards to man, animals and crops involved in the use of most of these materials cannot be overlooked. Everyone who has occasion to handle or use insecticides should be aware of the hazards and of the necessity of familiarizing themselves with and adopting adequate safeguards. Among the factors to be considered in the use of insecticides are: (1) Possible acute or chronic poisoning of the user; (2) possible damage to the crop being treated; (3) necessity of avoiding contamination of adjacent crops or pastures; (4) avoidance of damage to livestock; (5) possible injury to crops through accumulation of residues in soil; (6) possible damage to honeybees and other beneficial insects; (7) need for safeguarding other beneficial forms of life, such as fish, birds and other wildlife.

Entomologists recognize the importance of these hazards and also their responsibility to public safety involved in use of certain materials that are effective insect killers. Some of the hazards, and also precautions and safeguards that should be considered by insecticide users, are discussed in some detail in the report of the conference of federal and state workers concerned with cotton insect research and control, held at Jackson, Miss., Nov. 28-30, 1949. In recommending materials that involve hazards, the entomologists include precautions and safeguards that should be followed. Insecticide manufacturers usually include similar precautions on the labels. Cotton ginners and crushers can also help by taking every opportunity to impress on their growers the importance of being thoroughly familiar with the hazards involved in the use of cotton insecticides and of taking proper precautions when handling or applying them. The greatest benefit from insecticides can only be obtained through their intelligent use.

• **A New Era of Insect Control**—There is no doubt that we are well into a new era of cotton insect control. As previously mentioned, we already have a number of new organic insecticides which are now in extensive use by cotton growers. Recent developments indicate that liquid insecticides are coming into wide use for cotton insect control. Preliminary tests in 1948 with several organic insecticides applied in spray form gave promising results. More extensive tests made last year showed that concentrated sprays of these materials, applied with either ground equipment or airplanes, gave control of cotton insects equal to that obtained with dusts. Such pests as the boll weevil, bollworm, pink bollworm, thrips, cotton fleahopper, tarnished plant bug, rapid plant bug, cotton aphid and various pentatomids have been successfully controlled with these new type sprays. Many cotton-growing areas will no doubt see extensive trials of liquid spray concentrates by growers during the coming season.

• **The Pink Bollworm** — A general discussion of cotton insects directed primarily to the ginners and oil millers would hardly be complete without a brief review of the pink bollworm situation. This is the only major cotton insect pest which is the subject of an intensified control program involving state and federal quarantine action. Direct federal and state appropriations for enforcement of quarantine regulations and control measures at focal points of infestation approximate 1½ million dollars annually. Contributions by growers, processors, shippers and organizations, in both cash and services, amount to several times that amount. The Mexican government makes direct appropriations and growers, processors, shippers and others of that country likewise make sizeable expenditures for pink bollworm control.

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entomologists throughout the world as being the most serious insect pest of cotton. Without the exercise of adequate suppressive measures, it has been known to inflict severe damage in limited areas in the United States. However, it is a fact that little commercial damage has occurred in this country due to the vigorous and comprehensive control measures which have been carried on by state and federal agencies with excellent cooperation from the affected areas.

Outbreaks of the pink bollworm have been eradicated in Louisiana on two different occasions; in northern Florida and southern Georgia; from several areas in Texas; and in the Salt River Valley of Arizona, which area has just recently been released from federal pink bollworm quarantine. Success in these instances has been attributable to the aggressive measures adopted to eradicate the insect, coupled with the wholehearted cooperation of federal, state and local interests, including the ginners and cottonseed crushers. I wish to point out here that it is the policy of the Bureau of Entomology and Plant Quarantine to release areas from quarantine because of the pink bollworm just as promptly as it appears safe to do so. In so doing, however, we must continually bear in mind our responsibility not only to the areas under regulation, but also to the areas that are free from infestation by this very destructive insect pest.

The status of the pink bollworm infestation in the 1949 crop is very encouraging to those responsible for checking the spread and reducing or preventing damage by that insect. This is exactly the opposite of the situation which existed at the close of the 1947 inspection season. During 1947 the pink bollworm spread into an additional 38 Texas counties and eight Oklahoma counties. This was the first appearance of the pest in Oklahoma. Inspections for pink bollworm in 1948 and 1949 disclosed no infestations in Oklahoma. The insect was not found, through inspections in 1948, in a number of the counties previously known to be infested in Texas. Only a few of the counties in northwest Texas that were infested in 1947 showed presence of the pink bollworm in 1949 and all eight of the counties just west of Waco were apparently free of infestation in 1949.

(Continued on Page 35)

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Why Early Ordering

Progressive cotton growers have come to look upon the problem of insect control as essentially one of insurance. Where growers have made their plans in advance and placed orders early, a more successful pest control operation has resulted.

By LEA S. HITCHNER
Executive Secretary,
National Agricultural Chemicals
Association, Washington, D.C.

THERE has never been a year in the history of cotton production in the United States when the proper application of pest control chemicals has not paid the grower dividends. While the intensity of the insect attack varies from year to year, the population of at least several of the 100 insects that prey upon cotton has always been sufficient to exact a heavy tax from the grower, often the difference between profit and loss.

In years favorable to its growth the boll weevil has taken as much as a half billion dollars worth of cotton. Losses from all insects are often expressed in terms of "one bale for the bugs and six for me." According to the Mississippi State College, growers in that state alone lost more than a million dollars last year from insect damage, much of which could have been prevented by the intelligent application of insecticides.

More impressive than figures showing cotton losses, however, are reports of field tests demonstrating what is being done to reduce the insect toll. Alabama Agricultural Extension Service tests show that the average gain in yield, resulting from the recommended application of insecticides, exceeds one-half bale per acre in all experiments conducted in four different sections of the state during 1949. In eight of these experiments, gains from insect control during the time the crop was being set and matured exceeded 1,000 pounds of seed cotton per acre over untreated areas.

Although insect control has always been a major problem for the grower, it becomes of still greater importance in view of the 1950 acreage reduction. Government plans call for the removal of five million acres from cotton production. This leaves 21 million acres for the production of cotton in 1950. Consequently, the grower is faced with the problem of maintaining income from fewer acres devoted to a "cash crop." Diversification, long advocated by agricultural leaders, may help to replace a part of the loss of income resulting from reduced cotton planting, but a practical program for all growers is the advantageous use of control materials with the aim of capturing that one bale in seven which is usually "donated" to the insects.

Industry has the productive capacity to meet the grower's requirements for agricultural chemicals even in an "insect year." There are a few growers who may recall last year's experience when they were not able to buy the particular brand of material they had selected from their regular dealer and consequently had to shop around to find it. In most instances, however, the grower was able to buy an effective control material even though it may not have been his first choice.

LEA S. HITCHNER

While industry has made available adequate supplies of agricultural chemicals in the cotton growing areas each year, growers can help industry further improve its service. The more thoroughly each understands the other's problems, the more satisfying will be the results.

Industry has gone to great lengths to employ the best skills available, and has spent huge sums of money to become familiar with the problem of cotton growers in all parts of the South. In this respect, industry has had the able assistance of federal and state scientists, who have been assigned to the task of helping the cotton grower to control his insect pests and diseases and otherwise increase yield. Industry appreciates this assistance and will continue to cooperate for the common good.

The National Cotton Council has done much to encourage study and research on cotton insect problems and to bring together representative growers, agricultural workers and industry leaders. The National Agricultural Chemicals Association has endorsed and assisted these cooperative efforts and will continue to do so in the future. If anything, these efforts should be strengthened and expanded for the mutual benefit of all.

Probably the first serious efforts to use chemicals for boll weevil control in a commercial way occurred about the time of the first world war. Since then our knowledge has expanded and it is possible to reduce insect losses with more success than even before. However, in our mutual attempt to more effectively reduce losses, control programs have become more complicated, involving the usage of several products in many cases, and necessitating more accurate timing of application.

From industry's viewpoint the demand for cotton materials comes at the end of the season. Since many of the materials used for cotton are also applied to other crops, the manufacturer must plan his production to fulfill the requirements of growers of these other crops, including emergency needs, and still maintain sufficient inventory to meet the needs of the cotton grower. Hence, cotton growers share the manufacturer's factory with fruit and vegetable growers, corn and alfalfa growers, the general public who use materials to control household insects and many other groups.

Fruit growers, for instance, usually plan their control programs well in advance of insect and disease outbreaks. Manufacturers are, therefore, able to plan their operations with some reasonable degree of accuracy in order to meet the fruit grower's requirements. The cotton grower by and large has not yet adopted this practice, meaning that the manufacturer is put in the position more or less of guessing as to his requirements. Industry carefully reviews federal and state control recommendations and tabulates data obtained from representative cotton growers. These facts serve as a guide to the manufacturer but still fall far short of permitting the most efficient plant operation. Consider, too, that in order to supply growers with the materials they will need this May or June, manufacturing operations were begun during the latter part of last year.

To manufacture agricultural chemicals, it is necessary to invest large sums of money, often millions of dollars for plant capacity. The manufacturer must engage the best technicians available to assure products which meet the specifications of recognized recommendations. He must have buildings in which to store the raw and finished materials and he must comply with numerous federal and state recommendations, pay fees and fulfill other requirements.

Of specific significance is industry's

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GY-PHENE 40-20 COTTON SPRAY and GY-PHENE E 60

GY-PHENE 40-20 COTTON SPRAY and GY-PHENE E 60

(4 Lbs. Toxaphene, 2 Lbs. DDT Per Gal.) **(6 Lbs. Toxaphene Per Gal.)**

1) Control every major cotton pest.
2) Long residual action even during rainfall.
3) May be applied at any time of day and night.
4) Relatively easy applications save time and labor.
5) Form stable emulsion in hard and soft water.
6) Suitable for both ground and air applications.
7) Root crops can be followed in close rotation.

The Geigy record: 5 years field experience with spray concentrate formulations—extensively tested and used on cotton during past year.

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Gy-Phene 20S (TOXAPHENE-SULPHUR)

EMULSIONS: Geigy E25 (25% DDT)
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research program, conducted as a part of product development. It has been estimated that between 500 to 1,000 products per year are receiving some study only to be abandoned and never marketed for a variety of reasons. The Bureau of Entomology and Plant Quarantine of the U.S. Department of Agriculture is receiving today from industry, approximately twice as many good potential insecticides for experimentation and testing as were received three years ago. The advent of new products, plus the time-tested stand-bys, has given the cotton grower the widest range of control materials in history.

In addition to testing for insecticidal and fungicidal activity, industry is continuing its extensive program of toxicological research to assure that a given product, when used in accordance with the manufacturer's label, remains within the limits of safety. The investigative cost of one of the newer insecticides, in reference to various aspects of toxicology, has approximated $100,000. At all times, the grower should follow the manufacturer's recommendations for usage.

These are a few of the problems and activities of the manufacturer engaged in the production and distribution of agricultural chemicals. Because of the time required to produce these chemicals the manufacturer must begin operations far in advance.

After the manufacturing process has begun it is difficult to alter the schedule to meet wide shifts in product demands or emergency conditions. The manufacturer is in about the same position as the cotton grower would be if he attempted to shift his cotton acreage to some other crop in mid-July. Yet the change could be brought about if plans were made before the season began.

Industry has a keen sense of responsibility to:

1. Deliver a quality of material which will satisfy the grower's needs.
2. Assist in every possible way the production of high yield and quality.
3. Make supplies of agricultural chem-

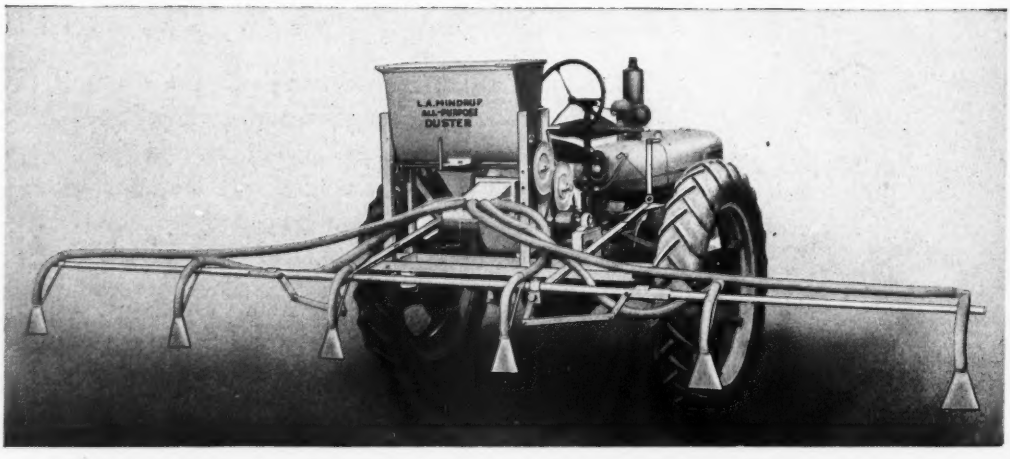
Little Bugs Make Differences

ON THE LEFT—Cotton on this farm paid off through high yields efficiently produced. The crop had the benefit of good seed, properly treated; good land, properly fertilized; early-season insect control, properly applied; and early harvest for high grade. ON THE RIGHT —Good plants on good land—but the bugs got most of the fruit.

L. A. MINDRUP ALL-PURPOSE DUSTER

HAS LARGE BALL BEARING FAN which assures high pressure at the nozzle opening.

This is very essential for complete coverage of the plant. The under side of the leaves are dusted as well as the top.



The tractor mounted type, as shown, is driven from the side pulley on the tractor. We also have the same duster mounted on a trailer which is driven from tne power takeoff.

THE L. A. MINDRUP ALL-PURPOSE DUSTER has the most perfect feed control of any duster on the market. The large dust hopper has two compartments for two different kinds of insecticides, and they are fed into the fan in any proportion. The mixture can be varied from less than 1 percent of one insecticide to 99 percent of another, or any proportions desired, and the feed remains constant without variation until changed. There is quite a saving in buying them separately, instead of ready mixed, and there is the added advantage of being able to vary the proportions used to suit the requirements, at the time of dusting. Write us for Dealership in your territory.

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icals available when needed.

4. Deliver these products in an orderly, non-speculative, business-like manner at the lowest possible cost.

Therefore, the cotton grower can do much to assure a dependable supply of products needed by determining now what he is going to use, and by placing an order for at least part of his requirements.

Effective large scale pest control cannot be carried on successfully as an emergency measure. Where growers have considered pest control as insurance, and have made their plans in advance and placed their orders early, needs have been met in full and a more successful pest control operation resulted.

Insecticide manufacturing, like cotton growing, is a highly technical and complex business, requiring special knowledge and skill. There is every reason why a working partnership between the two should exist and grow for the mutual benefit of both, and the ultimate satisfaction and pleasure of the consumer.

■ The 1949 season was the first one in which large quantities of the newer insecticides were used. The usefulness of these materials was demonstrated. Even though there were incidents where they failed to meet expectations, it was clearly shown that they will continue in high favor with cotton farmers. The demand for them—which in some areas exceeded supply—further illustrated the acceptability of the new insecticides.—Dr. S. A. Rohwer, assistant chief, Bureau of Entomology and Plant Quarantine, Washington.

Developments in Cotton Insect Control

(Continued from Page 31)

This favorable situation in the outlying sections of the area where the pink bollworm infestations have been known to occur appears to be the result of measures that were invoked to prevent carry-over in such sections. Such measures included sanitation at gins and other concentration points and treatment of seed to kill all pink bollworms present therein. Also, suppressive measures along the international border have been particularly successful during the past two years and as a result fewer moths were available for dispersal from the focal points of infestation to re-infest these outlying counties. Cultural controls involving regulated planting and stalk destruction dates, coupled with vastly improved farming practices in general, have been primarily responsible for reduction in pink bollworm infestation. Insecticidal applications to "hot spot" infestations through use of public funds have been of material benefit. The widespread use of new insecticides, particularly DDT, for control of other cotton insects has also helped.

The recent resumption of the program to eradicate wild cotton in southern Florida in order to prevent spread of the pink bollworm to cultivated cotton is of particular interest to cotton growers of Alabama, Georgia, South Carolina and other states east of the Mississippi. The pink bollworm infestation was increasing rapidly in the wild cotton on the keys between Miami and Key West. Wild cotton had made rapid growth in the Fort Myers area which is some 200 miles closer to cultivated cotton than that on the Florida Keys. Inspections made thus far indicate that either a very light pink bollworm infestation occurs in the Fort Myers area or that reinfestation may not have taken place during the two years the wild cotton eradication program was suspended.

Mississippi Crushers Will Meet in Biloxi June 15-16

The forty-first annual convention of the Mississippi Cottonseed Crushers Association will be held in Biloxi June 15-16, Secretary J. A. Rogers, Jackson, has announced. Headquarters for the meeting will be at the Hotel Buena Vista.

Tri-States Superintendents Set Meeting June 1-3

June 1-2-3 has been decided upon as the time for the Tri-States Oil Mill Superintendents Association annual convention, according to L. E. Roberts, Memphis, Tenn., secretary-treasurer of the organization. Hotel Peabody at Memphis will be headquarters for the meeting.

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Economic Value of Insect Control

By CLAUDE L. WELCH
Director of Production and Marketing, National Cotton Council of America, Memphis, Tenn.

DID YOU ever look at a boll weevil under a microscope? Looks like the very old devil himself, doesn't he? And what about the bollworm, the leafworm, the fleahopper and the aphid? Instead of being just a bunch of pesky little critters, they take on the aspects of monsters.

If you ever get to the point where you think of the boll weevil and his buddies as "just a bunch of unpleasant little insects," remember the way they look under the microscope. Then you'll have them back in their right perspective. They are big, they are mean, and they are too gosh-awful expensive for any of us in the cotton business to take to raise and feed.

• **Cotton: 33 to 50 Percent of Total Farm Income**—And that's true in spite of the fact that our cotton industry is one of the biggest and most vital in America. Today over 13 million people are depending on cotton for a major part of their income. In 1949 over 33 percent of the entire farm income of the 10 major cotton producing states was derived from cotton. In some states such as Mississippi, Arkansas and Alabama, cotton provides as much as 50 percent of the total cash receipts from farm marketings.

• **Cotton Crop Worth Nearly $3 Billion**—The value of the 1949 United States cotton crop is estimated to be in the neighborhood of $2,726,000,000. It is estimated that over 14 billion dollars is invested in cotton farms, gins, oil mills, warehouses and spinning mills. With this tremendous investment, it is small wonder that the cotton industry has directed its attention to reducing cost and improving quality of American cotton.

Increased efficiencies and improved qualities can mean increased markets for cotton, they can mean lower priced cotton goods for the consumer, they can mean greater net income for the producer and processor, or they can mean any number of other improved conditions. Although there are numerous cotton projects under way directed toward cost reduction and quality improvement, such as mechanization, insect control, fertilization, defoliation, chemical weed control, fiber quality studies and numerous others, all of which contribute toward placing cotton in a better competitive position, insect control can be singled out as one of the greatest potential means of decreasing production costs as well as improving the quality of American cotton.

• **New Interest in Controlling Insects**—There is greater interest in cotton insect control today than there has been since the boll weevil first invaded the Cotton Belt during the early part of this century. Without attempting to list the reasons for this interest in their order of relative importance, some of the main factors are: (1) The staggering loss to cotton insects in 1949, (2) the development of organic insecticides, (3) the wide-spread effects of educational programs and (4) relatively good prices for cotton.

CLAUDE L. WELCH

Cotton Pests Take a Heavy Toll of the Crop

To most laymen the term "cotton insects" in the past has been almost synonomous with the boll weevil. This is only natural, since from the time the boll weevil crossed the Rio Grande in 1892 and spread in ever widening circles across the Belt, this pest has been the most destructive of all insects attacking cotton. However, the bollworm, the cotton leafworm, the pink bollworm, the aphid, the cotton fleahopper and a dozen other pests in various years and in widely scattered areas have taken a heavy toll from the cotton farmer.

• **1949 Damage $470 Million** — Preliminary, unofficial estimates indicate that insect damage to the 1949 cotton crop is the highest in 22 years, amounting to approximately 470 million dollars. This is over one-seventh of the value of the entire cotton crop. Based on an average price of 30 cents per pound, loss of lint would amount to 422 million dollars. In addition, it is estimated that pests destroyed 1,127,000 tons of cottonseed valued at 48 million dollars. The total loss of 470 million dollars is the greatest since 1927 when estimated cotton and seed losses amounted to 550 million dollars.

These are fearsome figures indeed. They mean a heavy loss in net income to every farmer and processor in the Cotton Belt. Of course, since insect infestation varies in each state, some farmers are affected more adversely than others. In the four southeastern states of Mississippi, Alabama, South Carolina and Georgia, farmers lost 256 million dollars of the Beltwide total. Some individual farmers lost more than half of their cotton crop.

• **What the Consumer Lost**—To look at the picture from the consumer's standpoint, it is estimated that the 1,127,000 tons of cottonseed lost to insects in 1949 would have supplied the oil needed for 368 million pounds of margarine. It would provide 507,426 tons of high protein meal and 279,452 tons of hulls which could have been translated into an additional 327 million pounds of beef or into over a billion gallons of milk.

The lint cotton lost was sufficient to supply the United States with all of its tire cord, plus all the fabric needed for making cotton bags for feed, flour, sugar and hundreds of other commodities, plus all cotton used in the manufacture of flameproof cotton insulation. And still there would have been thousands of extra bales available for other uses.

• **What Ginners and Crushers Lost**—To bring this critical problem a little closer home, look at it from the viewpoint of the individual cotton ginner and cottonseed crusher. When the loss of 2,811,000 bales attributed to cotton insects in 1949 is distributed among the 7,880 active cotton gins throughout the Belt, each gin lost the revenue from over 350 bales of cotton. And looking at it from the viewpoint of the cottonseed crusher each mill would have had an additional 3,314 tons of seed to process. These amounts represent a very considerable reduction in each individual operator's income.

"EACH GINNER and crusher can and should take upon himself the responsibility of encouraging and assisting the producers in his area to secure insecticides and of aiding them in following the recommendations furnished by the entomologists of each state."—THE AUTHOR.

It is true that certain areas suffered very little loss from cotton insects while other areas took a tremendous loss. In Alabama, for example, a striking example can be cited. This state suffered an estimated loss of 355,000 bales last year. In many cases the loss of 441 bales per

gin attributable to insects represented a substantial reduction in the operator's income. Often, this meant the difference between operating at a profit or a loss. When the loss of 143,000 tons of cottonseed in Alabama is apportioned among the 25 oil mills, we find that each one failed to receive 5,700 tons of seed due to insect losses. These examples clearly illustrate that cotton producers are not the only ones who take a tremendous loss when insects go uncontrolled.

• **What Ginners and Crushers Can Do**— Thus, it is easy to recognize that the entire cotton industry has a tremendous stake in the fight against cotton insects. Naturally, most individuals think the job is confined to the producer. There is no doubt that cotton insects can only be controlled on farms. However, the cotton ginner and the cottonseed crusher can play a significant role in assisting producers in planning and executing effective cotton insect control programs. Each ginner and crusher can and should take upon himself the responsibility of encouraging and assisting the producers in his area to secure insecticides and of aiding them in following the recommendations furnished by the entomologists of each state. Ginners and crushers are urged to join with their county agents and vocational agricultural teachers in planning an intensive insect control program for 1950.

Many farmers across the Belt are doing a good job of controlling insects. They are taking more interest in up-to-date insect control programs and are waging an all-out war against cotton insects in an effort to bring these losses to a minimum. The figures for 1949 may give the impression that farmers did not establish effective insect control programs.

• **Weather Favored Insects Last Year**— Several factors, however, contributed to severe losses caused by insects in the past year. First, a very mild winter was responsible for an unusually heavy emergence of insects in the spring. Second, persistent rains over the eastern part of the Belt were most favorable for multiplication of insects. Third, frequent rains were unfavorable for applying poisons. Fourth, a shortage of recommended insecticides and equipment aggravated the situation. Fifth, many producers failed to recognize the importance of insect control until it was too late. These points should emphasize that two major factors in controlling insects are (1) timeliness and (2) thoroughness of applications. Insecticides are recommended but must be used when and where required and in the proper formulation and dosage. If controls had not been used in 1949 the losses would have been much more severe.

• **More Farmers Are Poisoning** — The record clearly indicates that increasing numbers of farmers are applying insecticides to their cotton. For instance, in 1948, farmers in South Carolina applied insecticides to 72 percent of the acreage planted to cotton at an average rate of about three applications during the season. A total of 30 million pounds of poison was applied. This compares with the 15 percent of South Carolina cotton receiving insecticides in 1947.

Estimates from Georgia indicate that about 25 percent of the cotton acres received insecticide in 1948, at an average rate of three applications. A total of almost eight million pounds of poison was used on cotton. Mississippi entomologists estimate that 19 percent of the cotton in 1948 received poison at the rate of three applications. This represents about 14,439,000 pounds of poison used in 1948. It is estimated that 25 percent of the cotton in Oklahoma received insecticide at an average rate of 1.5 applications or about two million pounds of insecticides.

Insect Control Will Pay

Certainly there are many farmers who are including insect control programs in their farm operations. However, many producers across the Belt question the economics of applying insecticides, and if applied, to what extent they will increase his net profits. Experiments conducted across the Belt prove beyond a doubt that application of appropriate insecticides at the right time and in the recommended quantities pays big dividends.

• **Control Means Big Increases In Acre Yields** — South Carolina entomologists state that application of insecticides increased the yield of seed cotton by 500 to 600 pounds per acre. Converting this into dollars on basis of 1949 price, gross gains amounted to $73 per acre. Experiments in Mississippi indicate that insect control increased seed cotton yields 500 pounds per acre, or an increase in gross income of almost $67. Five applications of insecticide in Oklahoma increased yields 545 pounds of seed cotton per acre, or an increase of $72 in gross income.

In Arizona, where the boll weevil is not a problem, 90 percent of the producers poisoned their cotton in 1948, using 12 million pounds of insecticides. Although pest infestation was low in 1948,

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entomologists estimate that application of insecticides increased yields an average of 300 pounds of seed cotton or $30 increase in gross income per acre.

New Developments

The cotton farmer has always dreamed of an insecticide or a combination of insecticides which would control all insects. Today DDT, benzene hexachloride, chlorinated camphene, Compound 118 and others can complement and supplement the use of calcium arsenate, bringing his dream closer to reality. Tests in 1949 showed that concentrated sprays of organic insecticides applied with ground equipment and airplanes gave control equal to that obtained with dust. In addition, sprays have a wide range of usage in that they can be applied during most daylight hours, even under winds as strong as 15 miles per hour. Sprays will be of especial interest to high wind areas such as in some parts of Texas and Oklahoma. The Bureau of Entomology and Plant Quarantine, in cooperation with state agricultural experiment stations and other agencies, are working full time in an effort to determine the most effective and economical methods of utilizing these materials.

• **The Farmer Must Be Told**—There is evidence that progress is being made; however, it must be recognized that there is a crucial step to be taken if results of research are to be utilized by the cotton farmer. Development of improved insecticides means little unless the story can be channeled to the farmer. Extension services, vocational agriculture, the National Cotton Council and other organizations are exerting every effort to keep the cotton producer informed on cotton insects. Maximum results can only by attained when every cotton producer in the Belt realizes the importance of insect control, and takes the necessary steps to initiate an action program. The producer must realize that insecticides, although greatly improved, are not a "cure all," but that their effectiveness will depend largely on the ability of the producer to apply them in the recommended quantity and at the proper time.

• **Council's Insect Conferences**—For the past three years the National Cotton Council has sponsored an annual cotton insect control conference. The 1949 conference was held in Birmingham, Ala., and full reports were made on new developments in insecticides and in methods of application. This advance information has been helpful to manufacturers of insecticides in setting up large-scale production schedules. The conferences are evidence of the concrete results that can be achieved when industry, agriculture and government agencies crystallize their thinking and pool their energies in solving a mutual problem.

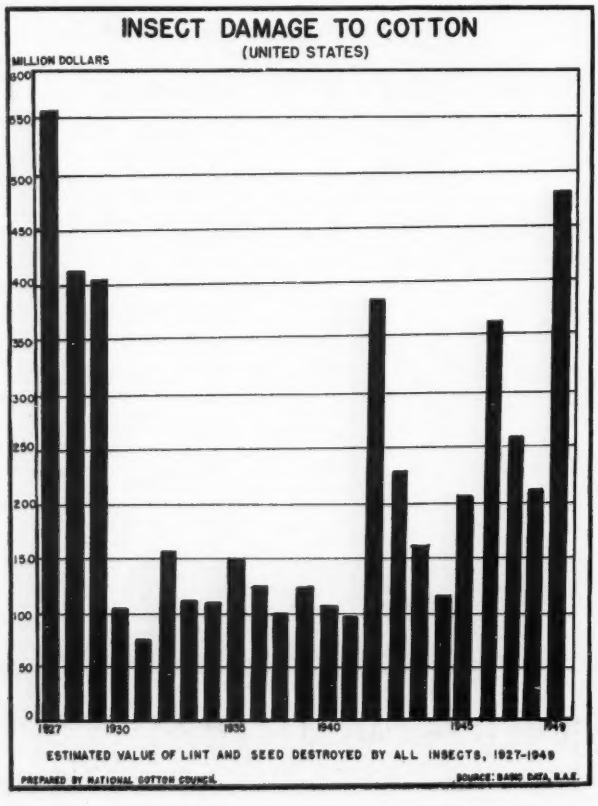
Since the initiation of the conferences, entomologists from the cotton producing states and USDA have made their recommendations on cotton insecticides weeks in advance of similar announcements in previous years. The early announcements of official recommendations have made possible much earlier development of insect control programs in each of the cotton producing states. This in turn has made possible a more thorough and extensive educational job on insect control at the producer level. The extension service and vocational agriculture have conducted splendid cotton insect control programs in each state. In general, the insect conference has resulted in a closer tie-in between the entomologist, manufacturer, the formulator, the distributor, the insecticide dealer and the cotton industry.

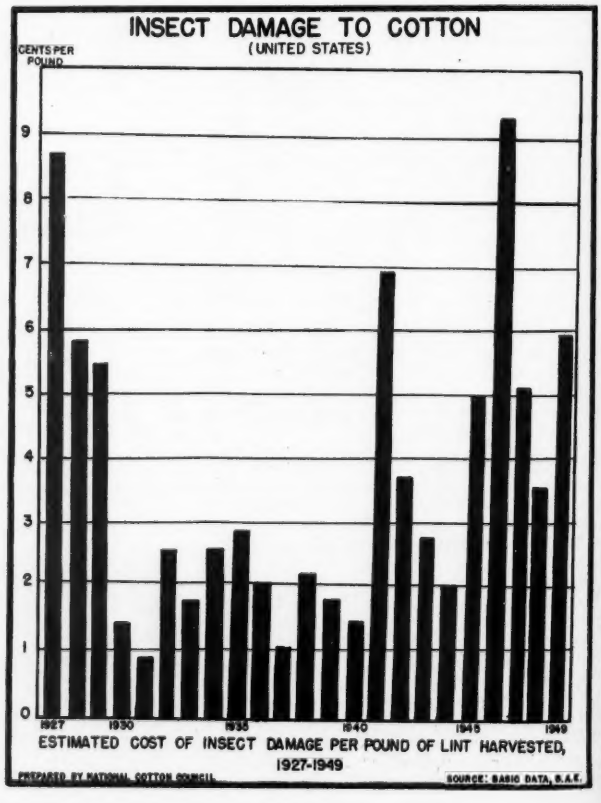
• **Good Cultural Practices Essential** — It should be emphasized that insect control alone will not make a cotton crop, but it must be a combination of improved practices designed to bring about more efficient cotton production; that all production practices should point to reduced cost of production and quality improvement. The labor cost of production per acre is about the same on an acre yielding two bales as it is on an acre yielding one-fourth bale—the only basic difference is the harvesting cost. Research is pointing the way to higher yields. Educational agencies, both public and private, are channeling the improved practices to the farmer. Research has developed good insecticides and application machinery. When used wisely by the cotton producer, significant increases in yields are the rule.

■ **COTTON GROWERS are urged not to risk wasting money experimenting with new and untried materials that have not yet been tested by the State or Federal entomologists.— Bureau of Entomology and Plant Quarantine, USDA.**

• **Fight Not Won** — The progress that has been made in insect control has not come about by accident. It is the result of hard work and effort on the part of those interested in this important problem. Although progress is being made, the fight has not been won. The boll weevil and his companions are still taking a tremendous toll from the cotton farmer.

In 1950, let's don't sell Mr. Boll Weevil short.





We Can Whip Insects

(Continued from Page 19)

Farm cleanup should be an integral part of the stalk destruction program. This means keeping pastures free of weeds and other debris that shelter insects. Roadsides, ditch banks, fence rows and other harboring places should be disked or mowed, or otherwise cleaned up, so as to destroy winter quarters without causing an erosion problem.

• **How Stalk Destruction Increases Yields and Controls Insects**—The experience of farmers in the Lower Rio Grande Valley of Texas is the most striking example of what early stalk destruction can accomplish. W. E. Conn, who is in charge of Pink Bollworm Administrative Area No. 3, which includes the Lower Valley counties, reported to this publication in the fall of 1949:

"Cotton growers of the Lower Rio Grande Valley of Texas produced an additional 445,000 bales of cotton with a gross value of $76,000,000 merely by plowing out their cotton stalks a few weeks earlier than usual during the past four years, 1946 through 1949.

"This increase in cotton production amounted to .210 bale per acre over the four year period. Before the program of early stalk destruction was started the average cotton production over a 10-year period, 1936 through 1945, amounted to .416 bale per acre in Cameron, Willacy, Hidalgo and Starr Counties.

• **50 Percent Increase**—Cotton production rose to an average of .626 bale per acre, an increase of 50 percent during the four-year period when stalks were destroyed early."

• **Controls Weevils, Too**—The primary purpose of the early cotton stalk destruction program in the Lower Rio Grande Valley is to control the pink bollworm, but it also reduced the boll weevil infestation.

"In 1945, following a poor cleanup," Mr. Conn reported, "51 percent of all squares examined during June were punctured by the boll weevil. Following the first early cleanup the infestation fell to eight percent and following the second early cleanup the infestation was only three percent. But, following a delayed cleanup in 1947 the infestation rose to 14.58 percent in 1948. The infestation dropped to 2.73 percent in 1949, the lowest on record, following an excellent cleanup in 1948. It is a matter of record that both pink bollworm and boll weevil infestations vary according to the date and thoroughness of the cleanup. Heavy infestations follow late cleanups and light infestations result from early stalk destruction.

"By the early destruction of cotton stalks," Mr. Conn concluded, "growers in the Lower Rio Grande Valley are now producing profitable crops of cotton where they once produced cotton insects in great numbers by failure to destroy stalks at the proper time."

• **Texas A. & M. Reports**—Last fall Texas A. & M. College made the statement that "the boll weevil has practically been eliminated as a major pest of cotton in the Lower Rio Grande Valley," and said that "plowing under cotton stalks is the most dependable method for controlling boll weevils."

• **K. P. Ewing Predicts . . .**—In September, 1949, K. P. Ewing, of USDA's Bureau of Entomology and Plant Quarantine, Waco, Texas, stated: "I believe that within the next few years cotton growers in the boll weevil area of Texas will practice early destruction of cotton stalks and early season insect control to such an extent that the boll weevil will be economically controlled."

While Mr. Ewing was speaking only of Texas, the practice he mentions can do the same job in all sections of the Belt where the boll weevil is a menace.

The 1950 Control Program

• **Dusts**—In 1950 dusts again should be the most popular material for controlling insects. Many farmers have dusting equipment and dusts will be readily available and plentiful.

Dust applications should be made when the air is calm or nearly so. The presence of dew is not necessary. Repeat application if washed off within 24 hours. *Consult your own state insect control recommendations for specific instructions as to the poisons to use and when to apply them.*

• **Sprays**—In 1949 sprays showed up well in tests over the Belt, especially for early season control. While there is still need for additional research information

(Continued on Page 41)

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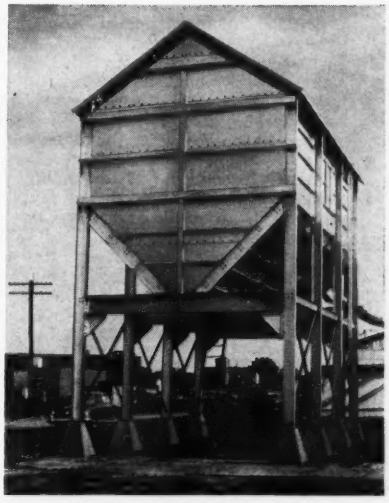

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From our Washington Bureau

By FRED BAILEY
and JAY RICHTER
Washington Representatives
The Cotton Gin and Oil Mill Press

BAILEY

RICHTER

• **Cottonseed Price Support Situation**—There are now clearly visible signs inside the Agriculture Department that grower prices for this year's crop of cottonseed will be supported . . . . at least in part . . . . through government guarantees on end products.

Ginners and crushers, who have been hotly arguing for this point of view, can claim major credit for the apparent shift in USDA thinking.

Officials attending the recent USDA-trade sessions in Memphis were impressed with the arguments of ginners and crushers. There is now active campaigning, inside the Department, for support of end products.

Hitherto, the Department has insisted that cottonseed would be supported in 1950 by a storage-loan program . . . . and no other . . . . despite last year's flop.

"It was perfectly clear at Memphis," said one official upon his return to Washington, "that cottonseed cannot normally be stored anywhere East of the irrigated areas. Any support program should permit seed to move into normal channels of trade."

USDA announcement of its cottonseed support program may have been made by the time this appears in print. Support price to producers is expected to be about the same as last year.

Method of support may remain in doubt for some time. Observers here are now guessing that the program will leave the way open for support by any, or all, of the following methods:

(1) Purchases, (2) support of end products, (3) by loans, with storage, if any, at mills, and (4) by loans with limited storage on farms and in warehouses.

Big problem in handling supports through processors, say officials, is working out both producer and trade contracts that will reflect to the grower the support price guaranteed him by the government. Procedure for co-mingling of seed, with an "average grade" basis of calculation, is also causing official worry.

Officials are awaiting trade recommendations, requested at Memphis, on these points.

• **Margarine Agreement Not Reached Yet**—Final agreement on margarine legislation is not expected before late this month.

Big holdup has been the amendment, offered by Sen. J. Allen Frear, Jr., of Delaware, requiring margarine manufacturers to pack their product in triangular shapes.

Senate and House conferees are in substantial agreement for inspection of both margarine and butter production . . . . and for stricter surveillance of advertising.

Margarine manufacturers argue that the Frear amendment would cost them $2½ million to $5 million. Machinery for triangular packing, they estimate, would take from two to five years to design and install.

Both houses have voted to repeal the 10-cents-per-pound tax on colored oleomargarine, a one-fourth-cent-per-pound levy on the uncolored product, and special federal license fees on manufacturers, wholesalers and retailers.

• **Senate in No Hurry on Acreage Adjustments**—Cotton planting may be well under way before Congress acts to increase acreage allotments of "hardship cases."

Senate consideration of House-passed amendments to the allotment law has been slower than anticipated. Some senators are balking the House action, saying that increases allowed by the lower body are too large.

The House would give growers not less than 70 percent of average acreage planted to cotton in 1946-48, or 50 percent of the most acreage planted in any one of those three years. War crop credit would be given.

Some senators also want to adjust the amendments to effect "permanent" changes in the present allotment law. The House-approved legislation would apply only to cotton planted this year.

• **Round-the-World Marshall Plan** — Don't count as dead the plan for a $50-billion, five-year round-the-world Marshall plan to be financed with money now going into our military budget.

Suggested by Sen. Brien McMahon of Connecticut, head of the joint congressional committee on atomic energy, the plan would include economic aid for Russia, as well as other nations.

In return, all countries would agree to devote two-thirds of arms spending to "constructive ends," and for an airtight program of inspection and international controls over atomic energy development.

Big gimmick, of course, would be the difficulty of getting together with Russia on the terms. But President Truman and State Secretary Acheson are being severely criticized in some quarters for their "stubborn refusal" to consider further negotiation with Russia.

Besides the over-riding hope for peace in the plan, some farm leaders see the McMahon program as perhaps the only way out of surplus troubles.

There is little doubt that the proposal . . . . if it could be made to work . . . . would ease a lot of current worry about mounting surpluses of cotton and other farm commodities.

(Note: Free copies are available from USDA's Bureau of Agricultural Economics of "Marketing Cotton and Cottonseed and Their Products." The volume is a bibliographical list of literature relating to cotton and cottonseed marketing.

The National Cotton Council, which recommends the new BAE list, is also out with an updated version of its publication, "Cotton Counts Its Customers.")

• **New Plan to Boost Exports**—A new effort to boost exports of cotton and other commodities is being talked up by some USDA officials.

The idea is to offer surpluses in exchange for strategic materials for stockpiling. That is not a new idea, where cotton is concerned, but offers would be made through a new international agency—the world commodity committee set up recently by the Food and Agriculture Organization of the United Nations.

Trouble is that the committee, like most committees, has no authority. It is simply "available" for any buyers and sellers who might want to negotiate.

• **USDA Warns Speculators**—"Curb that impulse to speculate," is the moral of survey results released recently by the Agriculture Department.

The USDA survey indicates that both small and large operators have only about one in six chances of coming off with a profit in grain futures. Losses of smaller speculators were about $12 million, compared with $2 million profits out of almost 9,000 cases studied.

Only 29 percent of grain business managers profited, according to USDA. Other percentages: retired persons, 27 percent; professional people, 24; manual workers, 22 percent, and farmers, only 21 percent.

High losses are attributed mostly to a tendency for speculators to take their profits, but let their losses run.

In other words, if you must speculate on grain futures, don't hesitate to close out loss positions.

Council Booklet Shows Main Uses of Cotton

Ninety-four leading uses of cotton are shown graphically in a new booklet titled "Cotton Counts Its Customers" which the National Cotton Council's Utilization Research Division has prepared on the quantity of cotton consumed in final uses in the U.S. during 1947.

A total of 1,024,210 bales of raw cotton was required to produce cotton products used in the automobile industry during that year, the publication shows. Second came men's shirts, which consumed 557,680 bales. Bags, using 483,960 bales, were third in the list and sheets, with 450,860 bales, were fourth. Other end products which used more than 100,000 bales of cotton each during 1947 include drapery and upholstery, towels, trousers, men's underwear, rugs and carpets, insulation, bedspreads, blankets, cordage, overalls, men's hosiery, industrial thread, curtains, men's gloves, laundry equipment, shoes, women's dresses, and medical supplies.

"Purpose of this publication," says the foreword, "and of others in the series, is to measure the size of the major cotton markets in order that gains or losses in each use may be clearly defined and the forces of research and sales promotion focused at the points where cotton has most to gain." The 32-page booklet has detailed information on production, precent of cotton, estimated consumption and other figures for all types of cotton consumption.

We Can Whip Insects

(Continued from Page 39)

on the subject, the use of sprays will be greatly expanded in 1950. Old and new formulations, as well as methods of application, will be closely checked over a wide area.

Sprays may be applied at any time of day when winds do not exceed 15 to 20 miles per hour. For early season treatment with ground equipment, one nozzle per row is sufficient. As the plants increase in size the number of nozzles should be increased to a maximum of three. It is recommended that the spray booms be mounted on the rear of the tractor. Sprays should be applied at approximately 60 pounds pressure at the rate of two to eight gallons per acre. Consult your own state control recommendations for specific information about the use of sprays in your own state.

We Must Be Ready

There is no way of forecasting insect populations in 1950. But ginners, crushers, growers and others whose business it is to hold insect damage to a minimum must take every precaution to see that materials and equipment in sufficient quantities are available for prompt use when needed.

■ **The insect control program must be prosecuted with vigor and with confidence. Last year's experiences in those states where insect damage was severe is no cause for discouragement. On the other hand, they should serve to inspire even greater efforts to control the pests this year.**

This Is Doing the Job Right

THE COTTON CROP was harvested and the stalks cut and disked into the land. The small grain planted after cotton furnishes grazing and protection from erosion. Clean fence rows and pastures give scant shelter for bugs.

■ **States that escaped serious damage last year can be thankful for their good fortune, but there is no room for complacency or let-up with respect to 1950. The warning signals are up and all signs point to a heavy carryover of weevils from 1949. Let's get our sights adjusted and be ready.**

We have the materials, the knowledge and a plan of action that will whip insects. All we have to do is use them wisely.

Cen-Tennial 6-Cylinder Overhead Gravity Cotton Cleaner

- Improved Design Cylinders
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CEN-TENNIAL COTTON GIN CO.

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J. G. CRAWFORD IS WINNER OF 1949 NORTH CAROLINA 5 ACRE CONTEST

His yield of 6,205 pounds of lint on five acres was worth $800 in prize money. Second place honors went to C. B. Stevenson.

Champion cotton grower in North Carolina in 1949 was J. G. Crawford, Davie County farmer who won the annual Five-Acre Cotton Contest with 6,205 pounds of lint on his five-acre plot. Crawford's outstanding record won him $800 in prize money. Sharing in the prize money was his Negro tenant, Alex Cuthrell. The award was made at a meeting at Charlotte on Jan. 30.

Second-place honors and $400 in prize money went to C. B. Stevenson of Iredell County, whose yield was 5,935 pounds of lint on five acres.

Both Crawford and Stevenson, as well as all district winners, grow Coker 100 Wilt Resistant variety. Staple length of Crawford's cotton was 1-1/16 inches. Stevenson's was 1-3/32 inches.

Awards were also made on Jan. 30 to winners in District 1. First place winner was Richard Beck, 4-H Club boy of Davie County, who produced 5,735 pounds of lint on five acres; second place winner was R. A. Abernathy, of Mecklenburg County, with 5,595 pounds; S. B. Burris, Stanley County, was third with 5,395 pounds. Beck was awarded $300, Abernathy $200 and Burris $100.

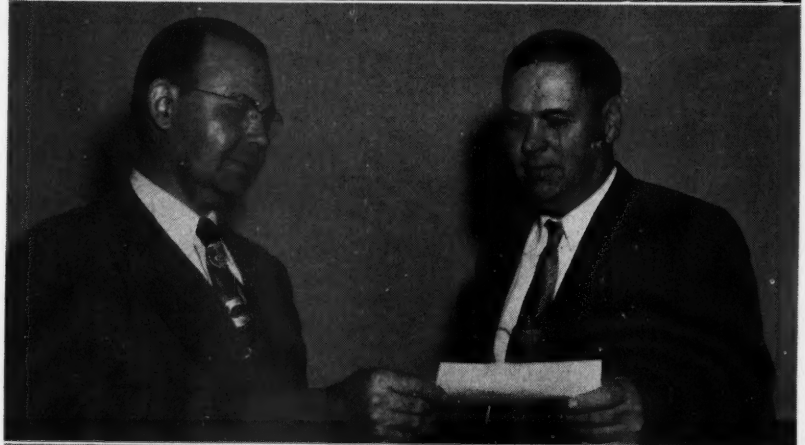
Floyd Cameron, a Negro 4-H Club boy of Harnett County, was awarded first prize in District 2 at a meeting in Fayetteville on Jan. 31. He produced 4,285 pounds of 1-1/16 inch lint on his five acres and won $300 for his efforts. Second place honors and $300 went to C. S. McArthur, Scotland County, whose yield was 3,805 pounds of lint, and third prize and $100 went to M. E. Thornton of Harnett County.

At a meeting in Tarboro on Feb. 1, Leonard M. Bender of Warren County was awarded $300 for winning top honors in District 3. He produced 5,415 pounds of lint on five acres. Staple length was 1-3/32 inches. Second-place honors in District 3 went to V. I. Hockaday of Halifax County, with a yield of 4,975 pounds of lint, and third-place honors went to T. A. Seaman of Warren County, whose yield was 4,710 pounds. Hockaday was awarded $200 and Seaman $100.

The prizes were donated by the North Carolina Cottonseed Crushers' Association for the fifth consecutive year. Prizes last year totaled $3,000.

Cotton production practices were discussed at the three meetings and the need of an insect control program to increase cotton yields and grades was stressed. Speakers at the meetings included F. F. Bondy, entomologist of the U.S. Department of Agriculture; George D. Jones, State College extension entomologist; D. S. Weaver, assistant director of the Extension Service; W. L. Nelson, agronomist of State College and the North Carolina Department of Agriculture; Dan F. Holler, extension cotton marketing specialist; J. C. Ferguson, extension agricultural engineering specialist; and J. A. Shanklin, extension cotton specialist.

Mr. Weaver presented the state and district prizes at the meetings and stressed the importance of efficient cotton production in 1950. Mr. Bondy reported on experimental work and the insect outlook for this year. Soil testing and cotton fertilization were discussed by Mr. Nelson; mechanization and ginning by Mr. Ferguson; the classing service by Mr. Holler; the results of the 1949 contest and plans for the 1950 affair by Mr. Shanklin; and insect control recommendations by Mr. Nelson.



■ **TOP PANEL—D. S. Weaver, left, assistant director of the North Carolina Extension Service, presents checks totaling $800 to J. G. Crawford, landowner, and Alex Cuthrell, Negro tenant, both of Davie County, winners of the 1949 State Five-Acre Contest.**

■ **CENTER PANEL—Mr. Weaver, left, presents $400 check to second-place State winner, C. B. Stevenson of Iredell County.**

■ **BOTTOM PANEL—Robert R. Coker, left, of Coker's Pedigreed Seed Co., Hartsville, S. C., producer of the Coker 100 Wilt Resistant seed used by all state and district winners; Richard Beck, center, Davie County 4-H Club boy who won first place in District 1; and J. A. Shanklin, right, cotton specialist for the Extension Service, who supervised the contest.**

Dusting and Spraying Tests

By Dr. F. A. FENTON
Oklahoma Agricultural Experiment Station, Stillwater

DURING the past four cotton growing seasons the Department of Entomology of the Oklahoma Agricultural Experiment Station has been testing the effectiveness of several of the newer insecticides in eastern Oklahoma against the two most important cotton insects in that region; namely, the boll weevil and the bollworm. Toxaphene, DDT, gamma benzene hexachloride and parathion, alone and in combination, have been used in the dust form.

In 1949 spraying was also tested.

During 1948 and 1949 studies were made on the fruiting of cotton in treated and non-treated or check plots. Of particular intrest to date are the results of tests made during the past two seasons. These have shown that a combination of three percent gamma BHC, five percent DDT and 40 percent sulfur, and another mixture containing 20 percent toxaphene and 40 percent sulfur, both applied as dusts at an average of 10 to 11 pounds per acre per application, have consistently made the best showing. The plots dusted with the above two mixtures have outyielded the plots dusted with calcium arsenate, principally because the latter insecticide failed to give adequate protection against the bollworm. In addition, in 1949, the plots dusted with calcium arsenate became heavily infested with the cotton aphid.

The possible use of sprays as well as dusts to control the two pests has been studied. Our 1949 tests have shown promise. The spray tested was prepared by adding an emulsifiable concentrate to water. This concentrate contained four pounds of toxaphene and two pounds of DDT per gallon. We applied an average of 1.6 to 1.8 pounds of toxaphene per acre with each application of spray.

We used a low-gallonage sprayer at 60 pounds pressure to the square inch with a T-type nozzle which produced a cone-shaped spray. At a tractor speed of five m.p.h. and one nozzle per row, we put out 2½ gallons of spray; with two nozzles per row five gallons of spray and with three nozzles per row, 7½ gallons of spray. At 80 pounds pressure the volume of spray was increased to 8½ gallons per acre with three nozzles per row.

The number of nozzles we used per row depended upon the size of the plants, In small cotton in the presquare stage, we used one nozzle per row, less water and a higher amount of the concentrate was added to the water. In fruiting cotton which averaged 2½ feet in height, we used two nozzles per row, and in cotton growing waist high and beginning to overlap, we used three nozzles per row. It is our opinion that more toxicant is needed per acre in tall cotton. We feel that one pound of toxaphene per acre is sufficient in small cotton, but that 1½ to two pounds per acre are needed in tall cotton.

The arrangement of the nozzles is important. With one nozzle per row the same plan can be followed as with dusting, namely, the nozzle should be centered over the row and used at an average distance of 10 inches above the cotton. In using two nozzles per row the nozzles should be adjusted to deliver the spray at an angle to spray the top as well as the sides of the plants. In using three nozzles per row, the spread of the lateral nozzles is greater while the third nozzle directs the spray to the top center of the plants.

One year's tests have shown that sprayed cotton yielded the same as dusted cotton. The infestation of boll weevils and bollworms was held down as low with dusting. There was no noticeable injury to the foliage and no injurious effect on the staple length and grade of the cotton which was picked. Since toxaphene controls both boll weevils and bollworms there is some question in our minds as to the need for the DDT.

Our fruiting records show that under average conditions of boll weevil infestation, the treated plots outyielded the check plots because of a greater number of bolls produced and a smaller percentage of damaged locks in the bolls matured on the plants. Blooming records do not show differences sufficient to account for our greater yields. This means that in Oklahoma greatest immediate benefits were obtained by *protecting the young*

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. . . and try to carry our full share of the responsibility of supplying the industry, we are now keeping in stock some of the hard-to-get items which we do not manufacture, such as:

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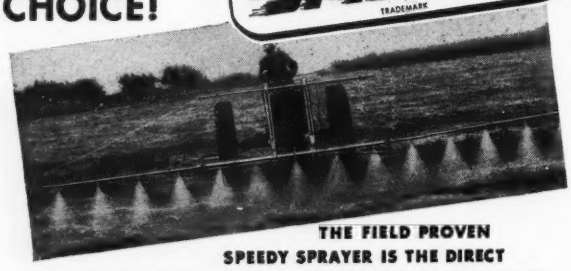

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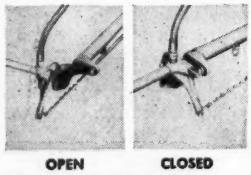

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DOUBLE ACTION HINGE . . . allows both spray booms to swing with obstruction, then return to normal position.

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Agricultural authorities are predicting the biggest year in Southern weed and insect control. The Speedy Sprayer offers you the opportunity to cash in on this profitable market. The 1950 Speedy is made to order for cotton insect control. Thorough, complete coverage offers efficient protection for all Southern crops such as vegetables, peanuts, etc.

OTHER EXTRA PROFITS WITH . . .

THE SPEEDY ROW CROP SHIELD will sell itself when farmers see its money saving features. Designed to protect growing crops during cultivation, the Speedy Row Crop Shield fits all tractors . . . priced to sell.

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bolls. This in turn means spraying or dusting when the plants are in bloom. To be must effective these treatments should be directed against first brood weevils. Two years' data show that these treatments should be started within one week after the first blooms appear and should be spaced at five to seven day intervals.

We also recommend two prebloom treatments, because, while overwintered weevils will not in themselves reduce yields, *they do delay the setting of the crop.* A heavy infestation of overwintered weevils has the same effect as late planting and it has been demonstrated many times that late planted cotton is subject to heavy boll weevil damage.

An average of 40 percent of the blooms in our treated plots made bolls. However, 85 to 95 percent of the first blooms made bolls. Therefore, a loss of too high a percentage of these first blooms means a direct loss of so many early produced bolls. The cotton plant will replace lost squares, but this will automatically mean a delay in the setting of the crop with resultant danger of boll weevil and bollworm damage and cut in yields due to drought.

In addition it has been shown that as a boll grows and matures, so does its resistance to the boll weevil. Thus the object of every cotton farmer should be to get as many bolls matured beyond the stage when they can be injured by the boll weevil as possible. Our data prove this because we have shown that the later a boll is set on the plants, the greater the number of locks are destroyed even in treated plots.

The first prebloom treatment should be made within one week of the appearance of the first squares to get as many of the overwintered weevils as possible before they have laid eggs. The second treatment should be made seven days later.

A variety should be planted that puts on its crop early and fast. It is possible to make a bale per acre in cotton which blooms for a period of 35 days as we did in 1949. In 1948 another variety required protection for a period of two months due in part to its slow rate of fruiting. However, in this connection, it has been found that the season has a greater influence than the variety. We know that 1949 was a season which was very favorable for early and rapid fruiting of all varieties. Yet even in 1949 when we were picking the second time and getting 90 percent of the crop, another later maturing variety in an adjacent field was being picked for the first time.

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Atlas Toxaphene Dust 20%

Atlas Liquid Toxaphene Concentrates

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We invite inquiries from qualified insecticide dealers and distributors. For information and price quotations, address—Waynesboro, Georgia —Cotton Insecticide Division.

Atlas Chemical Corporation

Waynesboro, Georgia

Heads Oklahoma Ginners

THE CONVENTION of the Oklahoma Cotton Ginners' Association on Jan. 30-31 was reported in our Feb. 4 issue but, unfortunately, we had no picture of the association's new president to publish with others that appeared in that issue. He is Amos L. Kobs, above, manager of the Western Cottonoil Company gin at Elk City. Mr. Kobs succeeds Alexander Grossman of Canadian, who gave the association such fine leadership in 1949. Mr. Kobs heads an alert state ginners' organization and we know it will continue to progress with him at its helm.

William Karl, Allan Kline On Texas Ginners Program

William Karl, president of Firestone Textiles, Akron, Ohio, and Allan B. Kline, president, American Farm Bureau Federation, Chicago, Ill., will be speakers at the Texas Cotton Ginners' Association convention in Dallas April 3-5, Jay Stilley, executive vice-president of the association, has announced.

Mr. Stilley had previously announced that Ralph S. Trigg, CCC president, will be the principal speaker at the meeting.

Mr. Kline will speak at the afternoon session on the second day of the convention, Mr. Stilley said. Mr. Kline is to attend a meeting in College Station that morning and, in order to make it possible for him to talk to the Texas ginners, Nickey Naumovich of Pan-Aire Dusting Co. has offered to fly Mr. Kline from College Station to Dallas in his private plane.

Schreiber Is Made General Manager for Tobias

Paul Schreiber has been appointed general manager of the Max N. Tobias Bag Co., New Orleans, to succeed Morris E. Burka, who is now on the executive staff of J. T. Gibbons, Inc., and Meridian Grain & Elevator Co., mixed feed plants owned by Max N. Tobias, president of the bag firm, and Mr. Burka.

Mr. Schreiber has traveled in the southern states for several years and is well known in the oil mill business.

Johnston Is Mississippi Ginning Specialist

T. J. Johnston has been appointed assistant agricultural engineer for cotton mechanization and ginning, and has begun his statewide program, L. I. Jones, Mississippi Extension Service director, has announced.

This is the first educational work on the state level in Mississippi cotton mechanization, Mr. Jones pointed out. The Extension Service has not had a gin specialist for the last eight years.

In mechanization, Mr. Johnston's duties will include assisting implement dealers and county agents in holding demonstrations of machinery in cotton production. He will help ginners cooperating in the gin program to reduce costs through engineering, while increasing efficiency and turning out better ginned lint.

USDA Extension Man to Aid Philippine Agriculture

The Department of Agriculture has announced that John V. Hepler, extension specialist of the Office of Foreign Agricultural Relations, has gone to Manila to take up a newly-established post as U.S. agricultural advisor to the Department of Agriculture and Commerce of the Philippines.

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TWO POUND
BAGGING
21-lbs. TARE
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MANUFACTURING & SALES CO.
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State Recommendations

(Continued from Page 26)

such areas as have had success with its use heretofore. Under north Georgia conditions the 10 percent chlordane-five percent DDT dust has given satisfactory results.

2. Machines for catching boll weevils and other insects are not recommended.

3. BHC should not be used on cotton where Irish potatoes, turnips or beets are to be planted the following year, as these crops have been known to have off flavor following its use. Sweet potatoes and peanuts are not affected by the material.

4. Calcium arsenate will injure peach trees, soybeans, corn and cowpeas, if allowed to drift onto these crops.

5. Sulfur will severely burn melon plantings, such as watermelon, cantaloupe and cucumber.

6. A heavy dew is not essential for satisfactory dusting conditions, but the atmosphere should be calm.

7. A simple way to make infestation count is to pick at least 100 nonflared squares for each five acres as you walk diagonally across the field, picking equally from top, middle and lower limbs. The number of punctured squares out of each 100 picked is the percent infestation for that count.

(For additional information contact your County Agent, Vocational Agriculture Teacher, Veterans' Instructor, or the nearest Experiment Station.)

Control of Insects in —

• Louisiana

The major cotton pests in Louisiana are the boll weevil, cotton aphid (lice), bollworm and cotton leafworm. Less important are the cotton fleahopper, tarnished and rapid plant bugs, thrips and red spider mites. There are several poisons which will give adequate control of these pests. The time at which control operations are begun, the interval between applications and the thoroughness of application are more important for successful cotton insect control than the kind of poison used.

• **Early-Season Poisoning for the Boll Weevil**—Make two applications of a recommended insecticide when squaring starts in areas where over-wintered weevils are abundant. This is usually near favorable hibernation quarters, such as wooded areas, waste land and buildings. Treat only the areas where weevils are abundant.

• **Mid-Season Poisoning for the Boll Weevil** — Begin treatment on high-producing land when 25 percent of the squares are punctured and on low-producing land when 10 to 15 percent are punctured. *Treat only those areas of the field where the infestation shows poison is needed.* Don't start general treatment until the plants are fruiting vigorously.

• **Late-Season Poisoning for the Boll Weevil**—After migration of the boll weevil starts, usually about the middle of July in central Louisiana and about Aug. 1 in north Louisiana, make two or more applications for the protection of the bolls.

Calcium Arsenate is an economical and effective poison for control of the boll weevil and cotton leafworm. No other poison has been found to be more effective against the boll weevil. It gives boll protection late in the season superior to any of the organics tested. When it is used without an aphicide, an increase in the aphid population often results.

3-5-40 Mixture (three percent gamma isomer of benzene hexachloride, five percent DDT and 40 percent sulfur) will control the boll weevil, cotton aphid, bollworm, cotton leafworm, cotton fleahopper, tarnished plant bug, thrips, fall armyworm, cutworms and red spider mites.

Toxaphene will control the boll weevil, bollworm, cotton leafworm, cotton fleahopper, thrips, cutworms and fall armyworm. It usually will prevent an aphid build-up if used in all applications but will not "knock out" heavy infestation. Forty percent of sulfur should be included in toxaphene dusts to control red spider mites.

DDT will control the bollworm, cotton fleahopper, tarnished plant bug, cutworms, fall armyworm and thrips. Its use alone may be followed by severe cotton aphid and red spider mite infestation.

Nicotine (two percent) in alternate applications of calcium arsenate, when properly applied, will usually prevent an increase of cotton aphids. A fixed nicotine in dust form at 1½ percent of nicotine in calcium arsenate is as effective as nicotine sulfate at two percent of actual nicotine and has better dusting properties. Either two percent or three percent nicotine in lime can be used to "knock out" heavy aphid infestations.

CHLORDANE, PARATHION, TETRAETHYL PYROPHOSPHATE (TEPP), ALDRIN (COMPOUND 118) AND DIELDRIN (COMPOUND 497): *THESE ORGANIC INSECTICIDES HAVE BEEN TESTED. THE RESULTS OBTAINED WITH CHLORDANE DO NOT JUSTIFY A RECOMMENDATION FOR ITS USE ON COTTON. PARATHION, TETRAETHYL PYROPHOSPHATE, ALDRIN AND DIELDRIN ARE VERY TOXIC TO ANIMALS AND ARE EXTREMELY HAZARDOUS TO HANDLE; CONSEQUENTLY, THEY ARE NOT RECOMMENDED FOR USE ON COTTON.*

• **Application of Dusts**—All cotton insect poisons may be applied during either the early morning, late afternoon or night *when the air is calm.* For effective aphid control, it is necessary that the dusts stay down among the plants and not rise and float away. For this reason, late afternoon and night applications are preferable to early-morning applications. *Complete coverage is necessary.*

Any type of cotton duster, either ground machine or airplane, may be used to apply dusts. The swath should never be wider than that which is recommended for the particular machine. Never depend on drift for coverage. In the case of airplane applications, the swath should never be wider than the wingspread of the airplane, or approximately 40 feet. Marking of swaths by flagging, or some other means, is necessary for best results.

(Continued on Page 50)

Dusts Recommended for Control of Cotton Pests in Louisiana

Insect	Poison	Pounds Per Acre	Time to Treat	Intervals Between Application
Boll weevil and cotton aphid	(1) 3-5-40 mixture alternated with calcium arsenate	10 7 to 10		4 or 5 day
	(2) 3-5-40 mixture	10	25% of squares punctured on high-producing land, and 10-15% of squares punctured on low-producing land.	Same
	(3) Calcium arsenate-2% nicotine mixture alternated with calcium arsenate	7 to 10		Same
	(4) 20% toxaphene-40% sulfur mixture	10		Same
Bollworm	(1) 10% DDT-40% sulfur mixture	10 to 15	When eggs and 4 or 5 small bollworms per 100 plant tips are found.	5 days
	(2) 3-5-40 mixture	Same	Same	Same
	(3) 20% toxaphene-40% sulfur mixture	Same	Same	Same
Cotton leafworm	(1) Calcium arsenate	10	When leafworms appear	When needed
	(2) 3-5-40 mixture	Same	Same	Same
	(3) 20% toxaphene-40% sulfur mixture	Same	Same	Same
Cotton fleahopper	(1) 5% DDT-75% sulfur mixture	10	When 25 fleahoppers per 100 plant tips are found	7 to 10 day
	(2) 3-5-40 mixture	Same	Same	Same
	(3) 10% toxaphene-40% sulfur mixture	Same	Same	Same
Red spider mites	(1) Sulfur	20 to 25	When mite injury appears	When needed
Cotton aphid	(1) 3-5-40 mixture	10 to 15	When honeydew appears	When needed for "knock out"
	(2) 2 or 3% nicotine-lime mixture	Same	Same	Same

Telford Cheshire Goes With The Sinkers Corporation

Telford (Ted) Cheshire of Jackson, Miss., has recently become affiliated with the Sinkers Corporation of Kennett, Mo., processors and distributors of Sinkers cottonseed.

Mr. Cheshire is well known to seedsmen throughout the South, having represented the Albert Dickinson Co. as

TELFORD CHESHIRE

southern manager for the past four years. He was born and reared in Jonesboro, La., and obtained his B.S. degree in agriculture from Southwestern Louisiana Institute at Lafayette, followed by a period of 37 months with the United States Coast Guard.

Mr. Cheshire's field of operation with the Sinkers Corporation will cover practically the same area in which he has worked for the past four years.

Carolinas Ginners Move Association Office

Announcement was made Feb. 10 that the offices of the Carolinas Ginners Association have been moved to Bennettsville, S. C., from Red Springs, N. C., headquarters of the association since 1948. Mailing address in Bennettsville is P. O. Box 627. The office will be located east of Bennettsville on Highway 15, at the Cen-Tennial Ginnery.

J. F. McLaurin, president of the association, who lives at Bennettsville, extends a cordial invitation to ginners and others in the cotton industry to visit the new office at any time.

Werthan Bag Corp. Buys M. M. Bosworth Co.

Werthan Bag Corp., Nashville, Tenn., has purchased the M. M. Bosworth Co., bag manufacturers and dealers in Memphis, Tenn., Joe Werthan, president of the Nashville firm, has announced.

Millard M. Bosworth, president of the Memphis company, will be associated with the Werthan Bag Corp., Mr. Werthan said. The Bosworth firm has manufactured textile bags and reconditioned used bags for more than 35 years.

Spinner-Breeder Meeting To Be Sept. 11-13

Sept. 11-13 has been set as the date of the joint meeting for the seventh Spinner-Breeder Conference and the silver anniversary convention of the Southern Combed Yarn Spinners Association in El Paso, Texas, George B. Walker, chairman of the Delta Council Advisory Committee, has announced. Delta Council sponsors the Spinner-Breeder Conference.

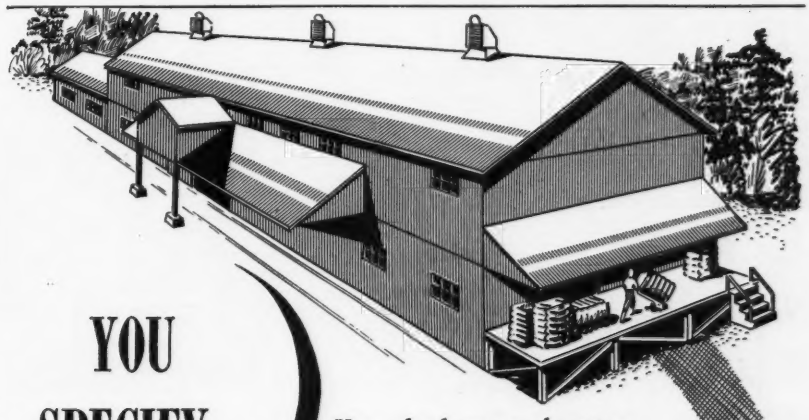
Representatives from host organizations in the El Paso area met with officials of the Delta Council and the spinners' association in Memphis recently to discuss details of the industry-wide meeting. Plans are being made for a special train to be routed from Charlotte, N. C., to El Paso by way of New Orleans.

North Carolina Crushers Offer Scholarship

The North Carolina Cottonseed Crushers Association has announced that it will again offer a one-year scholarship to North Carolina State College to the 4-H Club member doing the best dairy club work during 1950. The scholarship will be worth $150 to the winner.

Chas. L. Downs, Continental Sales Engineer, Dies Feb. 8

Chas. L. Downs, sales engineer for Continental Gin Company in Southeast Georgia, died suddenly of a heart attack at Albany, Ga., Feb. 8. He had been with Continental for 21 years. He is survived by his wife, a son and two grandchildren.



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You, the buyers of cotton gin buildings are assured of more exacting construction in buildings that are easily adaptable to fit the needs of the industry. Starbilt steel buildings are favorable in appearance, durable, easily expanded and 100% fireproof. Whatever your need, a Star building will satisfactorily answer the purpose for which it is built at LOWEST COST.

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Have You Met Your New Maid of Cotton?

THIS IS the official photograph of the 1950 Maid of Cotton, Miss Elizabeth McGee of Spartanburg, S. C. The Maid has been in New York for a month's training period and for fittings of her glamorous wardrobe of cotton fashions. Maid Elizabeth opened her tour in Miami on Feb. 6 and for the next five months will be traveling constantly for King Cotton, visiting more than 35 major cities in the U. S., England and France. In every city she visits, the Maid of Cotton will appear as featured model in all-cotton fashion shows to present the newest high-fashion cottons of the season. After her current swing across the South to California she will return to Washington, D. C., to end the first half of her U.S. tour. On March 18 she will board a plane in New York for a trip to England and France, after which she will return to the U.S. to complete her tour as King Cotton's goodwill ambassador.

SPRAY EXPERIMENTS IN MISSISSIPPI

EMULSION SPRAYS applied for thrips control were effective and the cost of applying them to cotton was reduced to a minimum when spraying equipment was attached to the cultivator and used when the crop was being cultivated. Emulsions applied for early-season boll weevil control with tractor-mounted spray equipment gave good results with less technical insecticide than could have been accomplished in dust form.

Mechanical injury to cotton with high clearance tractor sprayer was recorded, but it was below the level of significance. Emulsions were as effective as dusts in controlling cotton insects, and could be applied during many hours of the day when windy weather would prevent the application of dusts. Several organic insecticides applied as emulsions were highly effective against boll weevils developing in squares on plants and in fallen dead squares.—E. W. Dunnam, Bureau of Entomology and Plant Quarantine, USDA, reporting on experiments with spray emulsions at Stoneville, Miss., in 1948-49.

At Meeting Feb. 2-3—

USDA Research on Oilseeds Reviewed

Oilseeds and Peanut Advisory Committee recommends new research projects and continuation of present lines of work.

The Oilseeds and Peanut Advisory Committee met with officials of USDA Feb. 2-3 to review progress of research on oilseeds and peanuts and to recommend work to be undertaken in the future, with particular reference to research and services under the Research and Marketing Act.

• **New Work Recommended** — The committee generally agreed that all RMA projects now under way on oilseeds and peanuts be continued. They strongly recommended, however, that two specific lines of work be accelerated immediately to the extent that funds permit: (1) Intensify fundamental research toward solving the problem of flavor stability in soybean oil; and (2) develop improved methods for sampling and inspecting farmers' stock peanuts, shelled peanuts and cleaned, unshelled peanuts.

The advisory group devoted considerable time to a discussion of new work that should be initiated if and when additional funds become available. The new lines of work recommended by the committee, approximately in the order of priority given to each, are as follows:

• **Utilization**—Determine, by actual tests with human beings, the amount of fat required in the diet of individuals according to age and occupational activity; develop improved uses and ways of using fats and oils now on the market for pastries, general baking, frying and salads with a particular view to developing better quality of the end products; explore the possibilities of processing cottonseed meal into flour for baked foods; improve the process for producing linseed oil and modifying it for specific purposes; increase the use of peanut meal as food and feed, if possible, by improving present methods for processing peanuts; obtain additional information as to methods, facilities and engineering costs of delinting cottonseed at oil mills; improve the use of flax straw for cigarette and other fine papers including better methods for separating partially cooked woody stem from the fiber pulp; determine the effect of fats and oils in the diet on the use of other nutrients, especially minerals and vitamins; obtain more information concerning common household practices in the use of different fats and oils as a guide to the qualities needed for specific purposes, and to potential outlets for the kinds of fats and oils available.

• **Production**—Develop superior varieties of soybeans for food, feed and industrial purposes with particular emphasis on varieties adapted to areas where soybeans are not now commonly grown; improve cultural and chemical means of controlling insects that attack soybeans and flax and for the eradication or control of southern blight and root rot of peanuts and other crops; find better

ways of controlling or eradicating nematodes of oilseed crops in the western states; develop improved methods and equipment for growing, harvesting, hulling and curing tung nuts; improve cultural and chemical means of controlling insects that attack growing peanuts; develop methods of handling and storing soybeans that will preserve their viability for planting seed; find better methods and equipment for harvesting, conditioning and storing peanuts and peanut forage in the Virginia-Carolina area.

• **Marketing** — In the general field of marketing, the oilseeds and peanut group reaffirmed recommendations made at its meeting last June for new work and listed several additional problems which should receive attention as soon as funds will permit. Recommendations for marketing research and service projects not already under way include the following:

Improved storage practices and fumigation or insecticidal treatments to prevent damage to stored peanuts from insects; develop rapid and reliable methods for determining the moisture content of soybeans and flaxseed; evaluate existing and potential markets for edible vegetable oils including corn, cottonseed and soybean oils and their products and help in expanding market outlets for them; determine the most efficient processing and marketing practices for flax, peanuts and peanut products, the cost of adopting better practices and then assist processors and distributors in making improvements; obtain data on the amount and kind of peanut storage space available to farmers in order to improve marketing schedules and storage methods for this crop; evaluate the need for additional current information on supply, marketings, inventories, utilization and prices for oilseeds and fats and oils at different stages of processing and distribution; analyze the efficiency of various facilities and practices with regard to farm and commercial storage of flaxseed in an effort to help farmers to do a better job of marketing and storing this commodity; study the marketing of soybeans in the main producing states with special reference to the effects of forward sales of soybean meal and oil; evaluate existing and potential markets for drying oils such as linseed, soybean and tung oils as a step toward expanding market outlets for them, study what effect changes in oil extraction methods (solvent, screw press, etc.) might have upon the soybean oil crushing industry, market outlets and returns to growers; ascertain consumer preferences for various cooking fats and oils and reasons for the preferences; determine how much cottonseed storage space is available and the most desirable methods for storing and handling it.

■ EXPERIMENTS conducted by the experiment station of Alabama Polytechnic Institute resulted in increased gains from dusting ranging from 766 pounds of seed cotton per acre to 1,243 pounds in different parts of the state under different conditions.

• **Doctor Cardon Discusses RMA**—During the course of their meeting, committee members heard Dr. P. V. Cardon, administrator of the Agricultural Research Administration, discuss administrative activities under the RMA since the administration of that act was assigned to the ARA last August. Assistant Secretary of Agriculture Knox T. Hutchinson spoke briefly to the group and expressed appreciation for the assistance these committees provide in rounding out a sound research program for agriculture.

Harry J. Deuel, Jr., head of bio-chemistry at the University of California, Los Angeles, served as chairman of the meeting. Other members attending were:

T. H. Gregory, executive vice-president, National Cottonseed Products Association, Memphis, Tenn.; J. H. Bryson, president of the Dothan Oil Mill Co., Dothan, Ala.; Otto G. Brandau, soybean producer, Rudd, Iowa; J. B. Edmondson, soybean producer at Danville, Ill.; William H. Fischer, manager, Peanut Butter Division, Jewett and Sherman Co., Milwaukee, Wisc.; Howard Kellogg, Jr., president, Spencer Kellogg & Sons, Inc., Buffalo, N. Y.; Lloyd Melhouse, flaxseed producer, Olivia, Minn.; A. D. Richardson, peanut producer, Floresville, Texas; and S. E. Statham, peanut and cotton producer, Cobb, Ga.

Members unable to attend were: Charles H. Murden, head of the peanut department, Planters Nut and Chocolate Co., Suffolk, Va.; Leo Fisher, cotton and soybean producer at Sikeston, Mo.; and Val Wurtele, president, Minnesota Paints, Inc., and vice-president of the Minnesota Linseed Oil Co., Minneapolis, Minn.

Maurice R. Cooper, administrative assistant to the ARA administrator, is the executive secretary of the Oilseeds and Peanut Committee.

WAUKESHA 6-NKU COTTON GIN ENGINE—7-in. bore x 8½-in. stroke, 1962 cu. in. displ., 240 hp. max., of Petersburg Co-op. Gin Association.

...less than 10¢ a bale
for ginning

Vic Blassingame, Manager, Petersburg Cooperative Gin Assoc., Petersburg, Texas, says: "Three years ago we installed a complete new 40-8 cotton gin . . . 6-NKU Waukesha Engine . . . During the season just completed we ginned 5,888 bales. We operate engine on natural gas . . . one meter feeds the engine, drier and three stoves. Our total bills for gas $479.20 . . . lube oil cost us $72.00. This if broke down into cost per bale would be less than 10c each. I know this is cheap . . . but I sold enough burr ash to cover all the above expense, so the engine was operated at a zero cost for the past year." Power your gins to pay profits —with Waukeshas designed to the specifications of experienced ginners. Get Bulletins 1520 and 1434.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
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State Recommendations

(Continued from Page 46)

• **Sprays**—Sprays on fruiting cotton last season gave promising results against certain insects where the amount of technical material applied per acre and the interval between applications were the same as those recommended for dusts. Sprays were not as effective as dusts against heavy infestations of boll weevils after migration started.

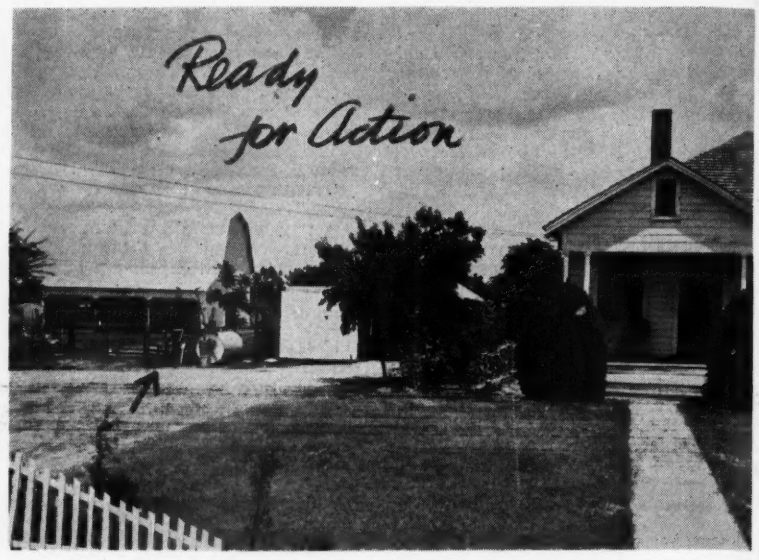
Sprays for the control of cotton insects are not recommended and will not be until they have been more thoroughly tested.

Timely information on special phases of cotton insect activity will be issued during the active insect season.

For further information contact your local parish agent.

The recommendations given here were prepared Dec. I, 1949, at Tallulah, La., by state and federal workers and are based upon the results of experiments conducted by the Louisiana Agricultural Experiment Stations and the Tallulah laboratory of the Bureau of Entomology and Plant Quarantine, U.S. Department of Agriculture.

(For additional information contact your County Agent, Vocational Agriculture Teacher, Veterans' Instructor, or the nearest Experiment Station.)



This Farmer Is Ready for Action

"BE PREPARED" is a good motto for the cotton farmer, too. Note the cotton dusting machine (see arrow) near the gasoline storage tank. A supply of dust is also on hand.

Control of Insects in—

• Mississippi

Mississippi farmers in 1949 lost an enormous sum, more than $100,000,000, on account of cotton insect damage. Much of this could have been prevented by careful poisoning when needed.

General Suggestions

1. **Order insecticides early.** The local dealer cannot possibly secure or carry in stock enough poison to fill all needs when every farmer waits until damage starts and then all want poison at once.

2. **Early poisoning** is recommended where thrips, fleahoppers, plant bugs and boll weevils are numerous early in the season, especially if early maturity is desired, even though resulting in a possible slight decrease in yield. Sprays are more economical than dusts for early poisoning. Early poisoning with calcium arsenate has not usually been profitable in Mississippi, but the new poisons will probably pay in any year when heavy infestations occur early in the season.

3. **After squaring begins, make weekly counts of punctured squares.** A simple way is to pick 100 squares as you walk diagonally across a field from two directions, picking them equally from top, middle and lower limbs. The number of punctured squares out of each 100 picked is the percent infestation for that count. Some growers prefer examining 100 squares in each of several spots in a field, picking off only the punctured ones. The number punctured in each 100 shows the percent infestation at that spot.

4. In **airplane** dusting, the planes should fly about five feet or less above the cotton and not attempt to cover swaths greater than the width of the plane.

5. **Do not apply any of the new organic insecticides as dusts in the *middle*** of the day as rising currents of air will prevent their being effective.

6. **Machines for catching boll weevils and other cotton insects are definitely not recommended.** No mechanical device has yet been found by federal or state investigators to be equal to chemical methods for controlling cotton insects.

7. **Sprays** were very satisfactory during the past season and some planters may prefer them, especially for early season applications where the spraying and cultivating can be done in one operation. They can also be applied over a wide range of conditions, even with fairly strong winds. For seedling cotton, one nozzle per row with ground equipment is suggested, with two nozzles on cotton up to 20 inches high and three nozzles on plants over 20 inches. Nozzles should be kept at least 10 inches from the plants to avoid leaf burn. For safety, the spray boom on ground equipment should be located behind the operator. For airplane spraying, a rate of one to two gallons per acre is suggested. Flagging is necessary for best results in airplane spraying. See additional suggestions for spraying below.

8. **Poisoning when weevils begin migrating** (usually around Aug. 1) will usually pay better than at any other time because of the protection to bolls. In years of heavy weevil infestations, poisoning may be needed much earlier than migration. In some years, early-planted, early-maturing varieties may be sufficiently mature by migration time to escape damage from weevils. Therefore, the cotton grower should know the situation in his fields and be prepared to do what is needed. Regardless of whether poison is used early in the season, when vigorously-fruiting plants have 25 percent of the squares punctured, control measures should be applied. In rainy seasons starting at 15 percent infestation will be safer.

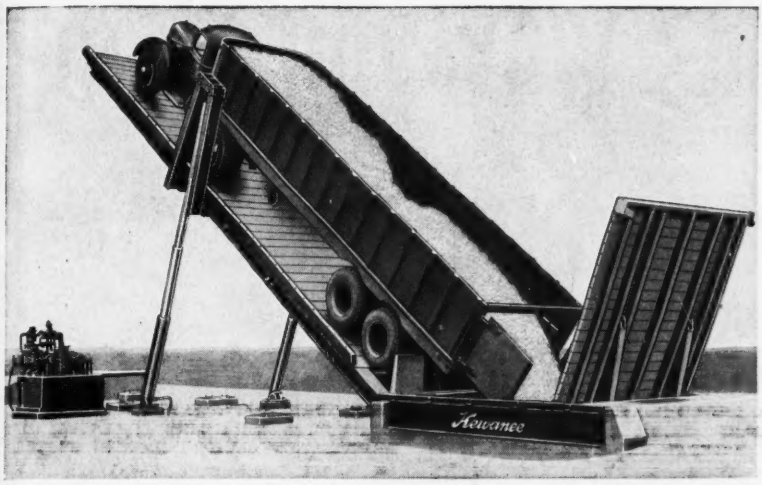
9. **Safety measures.** All of the materials recommended for cotton insect control are poisonous and some are apparently very toxic to man. Insecticide containers should not be opened in closed rooms. Operators should be careful not to breathe fumes from concentrated sprays and dusts, and should avoid as far as possible breathing the diluted materials. Gloves should be worn when handling concentrates and the hands should be washed frequently. A bath and a complete change of clothes should follow field operations or any work in which the clothing becomes saturated or contaminated. Where antidotes are known to be especially effective, as in the case of parathion, they should be carried by those using the chemicals, or available for immediate use if needed.

10. **Time between applications.** All applications, either dust or spray, should be made at four or five day intervals. During weevil migration, especially if the infestation is very heavy, the interval between applications should be reduced.

Dust Insecticides Suggested for 1950

1. **Three percent gamma benzene hexachloride-5 percent DDT with or without sulfur.** This mixture will control practically all cotton insects when used at 10 pounds per acre. If bollworms become numerous, the rate may be increased to 15 pounds per acre if the boll weevil is also a problem, otherwise 10 to 12 pounds per acre of 10 percent DDT will control the bollworms. The 3-5 mixture is used most economically when alternated at four- to five-day intervals with calcium arsenate at seven to 10 pounds per acre. The 3-5 mixture is apparently safe to use in fields with geese. Bees attending cot-

(Continued on Page 63)



New Product:

KEWANEE PLATFORM TRUCK DUMPER

The Kewanee Machinery & Conveyor Co., Kewanee, Ill., builders of truck dumping equipment for the past 30 years, have developed and are getting into production a new style hydraulically powered platform truck dumper that will require no pit beneath the dumper platform.

The objective in designing this new model Kewanee Dumper was to cut foundation construction costs to a minimum. All non-functional construction is completely eliminated. As shown in the accompanying illustration, the cylinders and power unit are mounted at the side of the dumper. It is, therefore, only necessary for the customer to provide footings for the dumper platform to rest on when it is in the down position.

The manufacturer says that on good level ground the installation can be accomplished with as little as 12 cubic yards of concrete for dumper footings and abutments, which is from 15 to 20 percent of that necessary for the present model. Owners familiar with present day construction costs will appreciate the saving involved.

Contractors, grain men and cottonseed oil mill superintendents who have seen the experimental model at the plant of Kewanee Machinery & Conveyor Co., or have seen plans of this new style dumper, are enthusiastic about the savings in installation costs that this new model will bring about. Estimates of savings run from $3,500 to as high as $10,000.

In areas with high water tables the advantages of avoiding deep cylinder pits is apparent. Protection from the elements need only be provided for the receiving pit and power unit.

Present models will be continued because of their adaptability to locations situated on high filled ground where it is not practical to place footings in unstable soil, or where the grade level is such that the construction of a pit under the dumper would not materially add to the foundation cost.

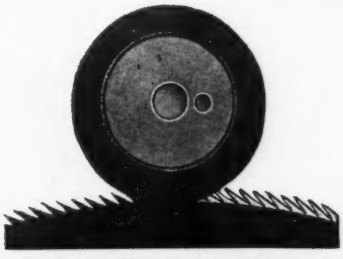
The new style dumper will have the same twin motor hydraulic power unit and will use the same cylinders as are used on the present models. Capacities of the various Kewanee Dumpers range from 80,000 to 100,000 pounds gross loads hauled in three axle tractor-trucks in combination with two axle semi-trailers up to 54 feet overall length. The Kewanee Machinery & Conveyor Co. expects to have the new style dumper available in the 40, 45 and 54 foot length platform dumpers, all with hydraulic power.

Tennessee Ginners to Meet April 14 in Jackson

The 1950 annual meeting of the Tennessee Cotton Ginners' Association will be held April 14 at the New Southern Hotel in Jackson, Harrold B. Jones, Memphis, executive secretary, has announced. Plans for the program will be announced later.

DOUBLECUT

Wood's Singlecut and Doublecut ROACH-BACK Gin Saw Gummers for All Machines.



Duplex Gin Saw Rotary Side Files for No. 14-X, No. 28-X, and No. 33

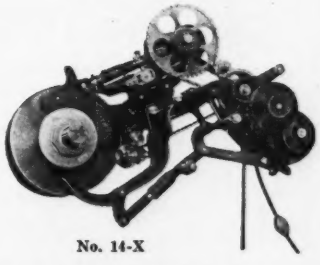
SINGLECUT

Wood's Singlecut and Doublecut STANDARD SHAPE Gin Saw Gummers for All Machines.

For Best Results use Wood's Perfectly Designed "DUPLEX" Gummers and Straight Files for All Makes of Gin Saw Filing Machines.

Write for Circular and Price List Showing Our Complete Line

No. 33



No. 14-X

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10 Reasons why you should choose and use *Niagara* COTTON DUSTS

1. **HIGHEST INSECT-KILLING POWER**—all Niagara products are laboratory tested before delivery to assure correct chemical analysis, proper formulation, and best possible dusting properties.

2. **FINEST PHYSICAL PROPERTIES**—assured by careful preparation of all the ingredients that go to make up specific formulations; and by the most modern particle-size reduction, mixing, and blending equipment.

3. **QUALITY-CONTROLLED PRODUCTS**—insecticides such as BHC, DDT, and calcium arsenate and sulphur are basically produced in Niagara-FMC manufacturing plants under close chemical supervision and quality control.

4. **FIELD-TESTED**—Niagara's research entomologists, through close cooperation with State and Federal agencies, evaluate insecticides in field tests. They release for production only the formulations that have been proved to be effective cotton insecticides.

5. **APPROVED BY COTTON PLANTERS**—the highest tribute to Niagara cotton dusts comes from the growing number of cotton planters in the South who are using Niagara cotton insecticides year after year.

6. **ECONOMICAL**—Niagara cotton dusts are always dependable. They dust well and distribute evenly at low poundages per acre. There is no waste or poor distribution of properly applied Niagara cotton dusts.

7. **BETTER CONTROL OF COTTON INSECTS**—there is a Niagara formulation for all major cotton insects and combinations of insects. You can depend on high performance from Niagara cotton insecticides.

8. **MANUFACTURING EXPERIENCE**—a pioneer producer of cotton poisons, Niagara has 46 years of experience in the production of insecticides for agriculture.

9. **SERVICE**—Niagara cotton-dust manufacturing facilities are located in the South for a better coordination of deliveries to the growers through the Niagara distributing organization.

10. **FIELD SERVICE**—Niagara field representatives are cotton insect-control specialists. Hundreds of planters rely on their advice and counsel in planning a cotton insect-control program. There are Niagara field representatives located in all major cotton producing areas.

BUY NOW AND BE SURE OF YOUR SUPPLY

Here are a few major Niagara products for cotton

Kolo Three-N-One Cotton Dust
Three-N-One Cotton Dust (BHC-DDT-Sulphur)
Two-N-One Cotton Dust (BHC-DDT)
BHC Dusts • Niatox (DDT) Dusts
Liquid Niatox (DDT) Sprays • Calcium Arsenate
ToxaKil (Toxaphene) Dusts and Sprays
Model AA Cotton Duster
Cyclo-Junior Hand Duster

• *Manufacturing plants in the South located at Jacksonville, Fla.; Greenville, Miss.; New Orleans, La.; Harlingen, Tex.*

WHEN YOU BUY Niagara YOU BUY PROTECTION

Niagara
CHEMICAL DIVISION
FMC
FOOD MACHINERY AND CHEMICAL CORPORATION
Middleport, New York

The Federal Recommendations

RESEARCH and extension entomologists from 11 cotton-growing states and the United States Department of Agriculture participated in a conference at the Walthall Hotel, Jackson, Miss., Nov. 28-30, 1949, to review and summarize their experiments and experiences in cotton insect control and to formulate a guiding statement for control recommendations in 1950. After a review of all available information, the report that follows was agreed upon by all the conferees.

Cultural methods as well as the use of insecticides for controlling cotton pests are considered in this report. The use of cultural control methods cannot be too strongly emphasized. It should be recognized that control of cotton insects by the use of insecticides is really supplemental to the adoption of good farm practices. These include such factors as early fall clean-up, seed treatment, early planting, fertilization, use of proper cotton varieties, proper land use and cultivation. Cultural measures are influenced by climate, soil conditions, fertility, topography and geographical location.

In addition to recommendations for the use of certain insecticides for the control of cotton insects, the report presents information believed to be of value to industry in planning production programs and to aid state and federal workers who cooperate with cotton growers in testing some of the insecticides that are still in an experimental stage. It contains some suggestions as to research needs in developing a more effective cotton insect control program. A general statement of plans by which the extension entomologists will aid in bringing the 1950 cotton insect control recommendations for each state to the attention of growers and all other interested groups is included. Control recommendations are presented in a general manner and are not specifically fitted to local needs. It is expected that each state, in preparing recommendations for cotton insect control for 1950, will adapt to its own conditions the information given in this summary.

Policy on Recommendations

Cotton growers spend millions of dollars each year to prevent or reduce the losses caused by the boll weevil and other insects. Fortunately, entomologists and chemists working together have discovered and developed many chemicals or insecticidal formulations that are effective in the control of cotton insects. Formulations are now available that may be used effectively against each of the species of insects and mites that are pests to cotton. To help avoid confusion of recommendations, when selecting insecticide formulations county agents, other agencies, and cotton growers should follow the advice and recommendations of the qualified entomologists in their states who are most familiar with their local problems. These are the entomologists in the state experiment stations, extension services, plant boards, departments of agriculture and the Bureau of Entomology and Plant Quarantine of the United States Department of Agriculture.

Research entomologists and chemists connected with federal, state and commercial agencies are continuing their investigations in the hope of discovering or developing new insecticidal formulations that are superior to those now used. Unfortunately, through the years, there have been put on the market various so-called boll weevil "remedies" that were of little or no value—and even where they had some slight value, they were usually less effective and more expensive than the standard insecticide formulations that had been widely tested by state and federal agencies. Cotton growers are urged not to risk wasting money experimenting with new and untried materials or mixtures that have not yet been tested by the state or federal entomologists. Cotton farmers have been persuaded by salesmen to spend much money in purchasing mixtures and machines that have little or no value in increasing the yields or improving the quality of cotton.

It is desirable that the results of research in cotton insect control not be reported to the public nor made a basis for recommendations until they have been made available to other entomologists working in the same field.

In making recommendations for the use of insecticides, entomologists should recognize their responsibility with regard to the hazards to public safety involved in the use of certain materials.

Hazards and Precautions in the Use of Insecticides

The development of the newer synthetic organic insecticides has provided more effective means of controlling insects, but it has also intensified numerous problems, such as hazard to man, animals and crops. With few exceptions, all insecticides are poisonous to animals and man and because of this they should be used with appropriate precautions.

The factor of immediate toxicity of insecticides to the user, to livestock and to plants is of great importance. In addition, there is the effect of delayed toxicity due to repeated exposures, of accumulations of deposits in soils and of residues on treated plants and on adjacent crops caused by drift. Users of insecticides should be thoroughly familiar with these various hazards and should take proper precautions when formulating, packaging, labeling and applying the materials.

• **Precautions for the User**—In considering the hazards to man, it is necessary to distinguish between the immediate hazards (acute toxicity) and the accumulative effects (chronic toxicity).

Insecticides can poison by being breathed or absorbed through the skin, as well as by being swallowed. Most solvents used in preparing solutions or emulsions are poisonous, and some are inflammable. Research and experience to date indicate that new chlorinated organic insecticides are reasonably safe to man and the higher animals at strengths normally applied for cotton insect control. In concentrated form, some of the chlorinated hydrocarbon insecticides may cause acute poisoning when in contact with the skin or if swallowed accidentally. Also, continued contact with or exposure to such materials may result in an injurious accumulation of the toxic ingredient in the body. Persons engaged in applying these insecticides should therefore avoid unnecessary exposure to

THE FEDERAL recommendations are broad in scope and are the basis for the state guides for controlling cotton insects. Because of their general nature the Federal recommendations are NOT to be used as a guide for your own state. They cover the whole field of cotton insect control and should be read by everyone interested in lowering production costs through a wider and more intelligent use of insecticides. The recommendations for individual states begin on page 21. Study those for your own state carefully and consult your county agent or your Experiment Station for additional information.

them. Wearing a respirator with suitable filter pads is advisable. The hands should be washed thoroughly before eating. After a dusting or spraying operation is complete, and at least once a day when handling or applying insecticides, it is advisable to bathe and change clothes.

The phosphorous compounds, such as parathion and tetraethyl pyrophosphate, *are extremely poisonous materials and (if used at all) must be handled with great care.*

It is not practicable to set forth here all precautionary measures that should be taken if phosphorous compounds are used. Such information is available through the Bureau of Entomology and Plant Quarantine and basic manufacturers, and all users should be thoroughly familiar with precautions and see that they are followed.

A few of the more important precautions to observe are the avoidance of breathing dusts, sprays or vapors—especially the concentrates and their vapors. This can best be assured by using a gas mask with a canister designed for organic poisons.

Loading and mixing should always be done in the open. Impervious gloves should be worn if it becomes necessary to handle the materials, but it is best to avoid any unnecessary contact with insecticide sprays as well as dusts. The concentrates are especially dangerous. As soon as possible after the use of phosphorous compounds, exposed personnel should bathe and change clothes.

It is advisable to have at hand in the field a change of clothing, soap and water, and a supply of atropine for emergency use. Quick action is essential in case any symptoms of poisoning appear. Those directing control operations should be prepared to assume full responsibility for enforcement of adequate precautions.

All empty containers in which insecticides have been packaged should be burned or otherwise destroyed immediately after emptying. Insecticides should always be clearly identified by labels and stored in a place where they are inaccessible to irresponsible persons and to domestic animals.

Both spraying and dusting operations should be done under such conditions and in such a manner as to avoid excessive drift to adjacent fields where animals are pastured or where food crops are grown. Care in preventing drift is also essential because certain varieties of plants and kinds of crops are injured by insecticides. Spillage of insecticides where they might contaminate water used by man or livestock should be avoided. Any excess dusts or sprays, even in small quantities, should be deeply buried.

Equipment used for applying weed killers should not be used for applying insecticides because of danger of crop injury.

• **Residues in Soils** — The effect of insecticides on germination, rate of growth and flavor of crops may be influenced by type of insecticide, formulation used, soil type, kind of plant and concentrations of residue in the soil. Information to date indicates that in the amounts and concentrations recommended for the control of cotton insects, no immediate hazard to crops is involved. Injury to several crops by higher rates of applications of some insecticides on certain soil types has been demonstrated.

• **Safeguarding Beneficial Forms of Life** —Insecticides destroy beneficial as well as injurious insects. Certain materials, particularly toxaphene, are also highly toxic to fish and other forms of aquatic life. It is especially important to use minimum amounts in cases where there would be an unavoidable drift to ponds and streams. In disposing of excess spray or dust materials, or when cleaning dusting or spraying equipment, every precaution should be taken to avoid the pollution of streams and farm ponds stocked with fish.

• **Preventing Bee Losses**—Dusting cotton may cause heavy bee losses. Calcium arsenate appears to be the most dangerous insecticide in this respect because field bees may carry it to the hive where it is fed to the developing brood. The organic insecticides employed for cotton insect control do not reach the brood as does calcium arsenate. Toxaphene appears to be less hazardous to use where bees are working flowers than benzene hexachloride or DDT. Chlordane appears to be more toxic than DDT or benzene hexachloride.

To hold bee losses to a minimum, it is suggested that:

1. Unnecessary dusting be avoided by careful scouting and timing.
2. Cotton growers notify beekeepers before dusting so that bees can be moved. Beekeepers should contact cotton growers before the cotton insect control season begins and request their cooperation. County agents may serve as clearing houses for such notifications. County agents and cotton growers should be given the exact location of apiaries.
3. Beekeepers be kept informed of cot-

Results---

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3% BHC - 5% DDT
Calcium Arsenate
Calcium Arsenate with Nicotine
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Blender-Formulator's of many other Agricultural Chemicals.
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DUSTS
Calcium Arsenate

BHC - DDT
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TOXAPHENE
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(BHC - DDT)

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■ IT SHOULD BE recognized that control of cotton insects by the use of insecticides is really supplemental to the adoption of good farm practices. These include such factors as early fall clean-up, seed treatment, early planting, fertilization, use of proper cotton varieties, proper land use, and cultivation.—Bureau of Entomology and Plant Quarantine, USDA.

ton insect infestations and recommendations for their control. This will enable them to locate bee yards in the safest available places and to know where and when dusting is expected to begin.

4. Dusting be done under good atmospheric conditions and care be exercised to avoid drift, particularly into bee yards.
5. Other things being equal, the insecticide be used that will be least toxic to bees.
6. Cultural control measures be used to reduce the necessity of insecticidal control.

If better understanding and cooperation can be developed between beekeepers and cotton farmers, bee losses can be reduced.

Methods of Applying Insecticides

• **Dusts**—In dusts the new synthetic insecticides are used as diluent toxicants in combination with carriers, such as talcs or clays, or in combination with other insecticides. Too much emphasis cannot be placed upon proper formulations.

Some of the synthetic insecticide formulations available in many areas of the Cotton Belt possess very poor dusting qualities. In some instances research workers have attributed erratic results and poor control of cotton insects to the inferior dusting qualities of the insecticide. The poor physical condition of some of the commercial preparations no doubt accounts for many of the failures experienced by cotton growers.

More information is still needed concerning insecticidal formulations to establish criteria for suitable organic dust mixtures. Some of these are flowability, adherence, density and particle size. Further research is needed to determine the most desirable carriers.

Although sulfur is not the most desirable diluent from a physical standpoint, it is recommended for use in those areas where red spider mites are usually a problem. Only a properly conditioned grade of dusting sulfur should be used in the formulations.

• **Sprays**—Preliminary tests with several organic insecticides applied in spray form in 1948 for cotton insect control gave promising results. Further tests in 1949 have shown that concentrated sprays of organic insecticides applied with ground equipment and airplanes gave cotton insect control equal to that obtained with dusts. Sprays have a wide range of usage in that they can be applied during most of the daylight hours, even under conditions of relatively strong winds (15 miles per hour). Boll weevil control has been obtained with as little as 0.5 gallon or as much as 10 gallons of spray per acre with the toxicant remaining constant at the recommended rate. Sprays have been successfully applied to cotton for control of the boll weevil, bollworm, pink bollworm, thrips, cotton fleahopper, tarnished plant bug, rapid plant bug, cotton aphid and various pentatomids. Most of the new organic insecticides can be made into emulsifiable concentrates. On addition of water, these give emulsions suitable for application. Slight foliage burning has been noted in some instances when the emulsion was improperly applied, or poor distribution was obtained.

Oil solutions of insecticides which were commercially available during 1949 have been tested with ground equipment and with airplane application. All of these resulted in an immediately noticeable speckling or burning of the foliage. Some of these solutions, when applied by airplane, resulted in chronic injury which culminated in large areas of the leaf being burned; and in some instances, small areas dropped out and left badly perforated leaves. Tests of experimental oils indicate that the viscosity and volatility of the oil and its aromatic content are the main factors causing the undesirable foliage reaction.

Solvents with the lowest boiling range and aromatic content which will dissolve the toxicant are the most desirable for use in emulsifiable concentrates. Emulsifiers and solvents should be tested for toxicity to the cotton plant and their general suitability determined before they are used in formulations.

(Continued on Page 59)

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Toxaphene	10% Toxaphene	4# Toxaphene, 2# DDT
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Progress in Insect Control

with special emphasis on the value of community action

By K. P. EWING

Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, U. S. Department of Agriculture, Waco, Texas

TWO YEARS AGO in this magazine (April 3, 1948) I spoke of the need of simplifying the cotton-insect control program so that every grower, at least in the main boll weevil belt, would find it worth while to participate in it every year. Although the goal has not been attained, a great deal of progress has been made during the past two years, especially in Texas, and I still believe that "this is not an idle dream of an impossible goal."

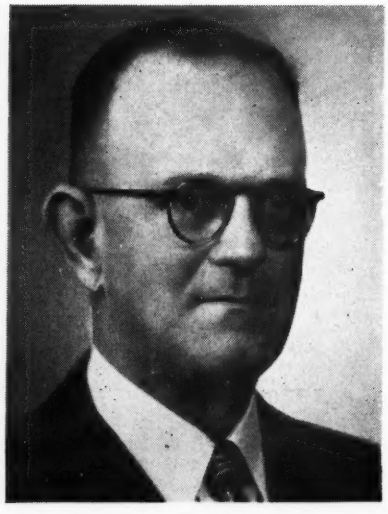
• **New Approaches Simplify Program**—Among the new approaches to the problem which are already simplifying the cotton-insect control program and making it more practical and less expensive, the following are believed to be outstanding: (1) The development of satisfactory emulsifiable spray formulations and low-pressure, low-volume spray machines which make it possible to apply insecticides effectively throughout the daylight hours and in the presence of 15 to 20 mile winds. (2) Presquare or early-season application of insecticides over large areas where insects are known to occur a majority of years, without the necessity of making insect population counts. Cooperation of cotton growers, on at least a community-wide basis, in the early destruction of cotton stalks, and early-season application of insecticides, has distinct advantages over individual efforts, particularly in control of the boll weevil.

Early Destruction of Cotton Stalks

For many years early fall destruction of cotton stalks has been recommended as a means of reducing weevil populations for the next season. However, no substantial, concrete evidence of its value was obtained until it was accomplished by community action.

In southern Texas pink bollworm regulations require that stalks be destroyed by specified dates. In areas where these deadlines are early enough and in years when these deadlines have been met, without extensions of time, this practice has reduced or prevented damage from weevils the following season.

• **Robs Weevils of Food Supply** — Destroying green stalks over a large area removes all food from the weevil, thereby either causing death from starvation or forcing this insect into winter quarters in such a weakened condition that it is unlikely to survive the winter. The excellent boll weevil control obtained from early stalk destruction in the Lower Rio Grande Valley of Texas during the last few years is a notable example of the benefits that can be derived from community action.



K. P. EWING

• **Increased Yields Impressive**—According to figures recently compiled by the Bureau of Entomology and Plant Quarantine, farmers in the four Lower Valley counties produced 50 percent more cotton per acre (average increase of 100 pounds of lint per acre) during the last four years by destroying stalks early than they produced during the preceding 10-year period when they did not follow this practice. In this area boll weevil infestations in June have been found to vary with the date and thoroughness of the stalk clean-up the preceding year.

Early destruction of cotton stalks is a worth-while practice for the individual farmer. The longer the period between stalk destruction and frost (weevil-starvation period) and the larger the area cleaned up, the better weevil control he can expect. Stalk destruction, however, does not materially reduce populations of other injurious insects, such as thrips, aphids and fleahoppers, and when the deadline cannot be met by Aug. 31, as is sometimes the case in the Lower Valley, it cannot be depended upon to give entirely satisfactory weevil control. Therefore, the stalk destruction program should be supplemented by a chemical control program. Early-fall destruction of cotton stalks followed the next season with early application of insecticides, both practices on a community-wide or county-wide basis, may be the answer to successful, economical insect control in many parts of the boll weevil belt.

Early-Season Application of Insecticides

The value of presquare, or early-season, application of insecticides for control of the boll weevil has been a controversial question for more than 25 years. My first experience in this field of experimentation was in Victoria County, Texas, in 1923. At intervals during subsequent years I have had various experiences and obtained conflicting results, and so have others who have experimented on this phase of boll weevil control. In my opinion, many of the failures can now be explained—the treated plots or areas have been too small.

Overwintered boll weevils often migrate in their search for large squares for food and egg deposition. They move within fields and also between fields, especially when the fields are small and not far apart. Striking examples of failures in early-season control of boll weevils, due to plots and fields being too small, were demonstrated in several experiments at Waco, Texas, in 1946. (See Ewing and Parencia, Jour. Econ. Ent. 40:374-381. 1947.) In one experiment a one-acre plot in a 12-acre field of cotton was treated several times with benzene hexachloride prior to June 7, while the cotton was in the presquare stage, to kill a heavy population of overwintered weevils. Excellent control of the

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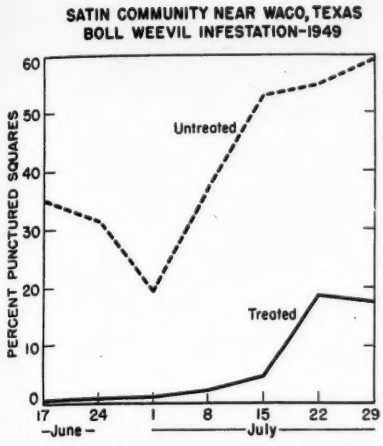

Figure 1—Excellent boll weevil control obtained from two early-season applications of insecticides in a community experiment at Waco, Texas. Dates of application were May 31 and June 8.

weevils was obtained, and on June 14 the treated plot had five times as many squares per plant as the untreated portion of the field. Because of the abundant supply of large healthy squares in the treated cotton, weevils began to migrate into it. On June 27 there were 1,410 weevils per acre in the treated and 152 in the untreated cotton, or in the ratio of nine to one. Naturally there was no increase in yield from the early-season treatment.

Experiments on Community Basis

In an attempt to overcome the evident cause of failure in the 1946 experiments and to give the new insecticides and the presquare treatment at least a workable chance to prove their value in controlling cotton insects, several experiments of a similar nature were subsequently conducted on a community-wide basis. These experiments were conducted in Wharton County, in the upper coastal area of Texas, in 1948, and near Waco, in central Texas, in 1949. They are described in two circulars issued by the Bureau of Entomology and Plant Quarantine, the experiment in Wharton County in E-772 (issued March 1949) and those in Waco in E-792 (issued December 1949). E-772 was reprinted in the April 2, 1949, issue of this journal. In both cases the value of community action in early-season application of insecticides was found to be tremendous.

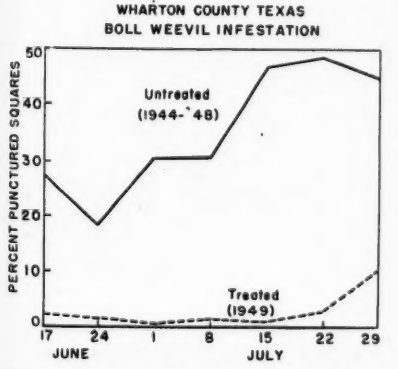

Figure 2—Survey records made in Wharton County, Texas, since 1944. The low boll weevil infestation in 1949, in spite of the extremely rainy season, is due largely to the county-wide early-season application of insecticides.

In Wharton County all cotton farmers in four communities participated by dusting their cotton twice with toxaphene while the cotton was still in the presquare stage. A total of 69 farmers dusted 6,214 acres of cotton in 111 fields.

• **Overwintering Weevils Practically Wiped Out**—Practically all overwintered boll weevils were killed before they had a chance to lay eggs. Fleahoppers and other early-season insects were also killed and reduced to below the damage point. Undusted communities nearby were utilized as checks. The early-season dustings increased the yield an average of 114 pounds of lint per acre. After the costs of the insecticides and applying them, as well as for picking and ginning the extra cotton, had been deducted, the net return was $30.48 per acre.

The experiments at Waco were conducted on a smaller scale than those in Wharton County (Figure 1). Farmers in two communities gave presquare or early-season treatment to a total of 1,400 acres of cotton. The all-purpose new insecticides were used. In some fields sprays and dusts were compared. Infestation and yield records showed that sprays gave control of all insects equal to that

Warning on the Use of Cotton Insecticides

Every person who handles cotton insecticides should keep constantly in mind that they are poisonous. As stated by the Bureau of Entomology and Plant Quarantine in the following extract from its 1950 insecticide recommendations, the phosphorus compounds are EXTREMELY POISONOUS. The manufacturers place suitable warnings on containers. Heed them carefully. Carelessness can cause injury . . . and could cost a life.

■ In considering the hazards to man, it is necessary to distinguish between the immediate hazards (acute toxicity) and the accumulative effects (chronic toxicity).

■ Insecticides can poison by being breathed or absorbed through the skin, as well as by being swallowed. Most solvents used in preparing solutions or emulsions are poisonous, and some are inflammable. Research and experience to date indicate that new chlorinated organic insecticides are reasonably safe to man and the higher animals at strengths normally applied for cotton insect control. In concentrated form, some of the chlorinated hydrocarbon insecticides may cause acute poisoning when in contact with the skin or if swallowed accidentally. Also, continued contact with or exposure to such materials may result in an injurious accumulation of the toxic ingredient in the body. Persons engaged in applying these insecticides should therefore avoid unnecessary exposure to them. Wearing a respirator with suitable filter pads is advisable. The hands should be washed thoroughly before eating. After a dusting or spraying operation is complete, and at least once a day when handling or applying insecticides, it is advisable to bathe and change clothes.

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■ Loading and mixing should always be done in the open. Impervious gloves should be worn if it becomes necessary to handle the materials, but it is best to avoid any unnecessary contact with insecticide sprays as well as dusts. The concentrates are especially dangerous. As soon as possible after the use of phosphorous compounds, exposed personnel should bathe and change clothes.

■ It is advisable to have at hand in the field a change of clothing, soap and water and a supply of atropine for emergency use. Quick action is essential in case any symptoms of poisoning appear. Those directing control operations should be prepared to assume full responsibility for enforcement of adequate precautions.

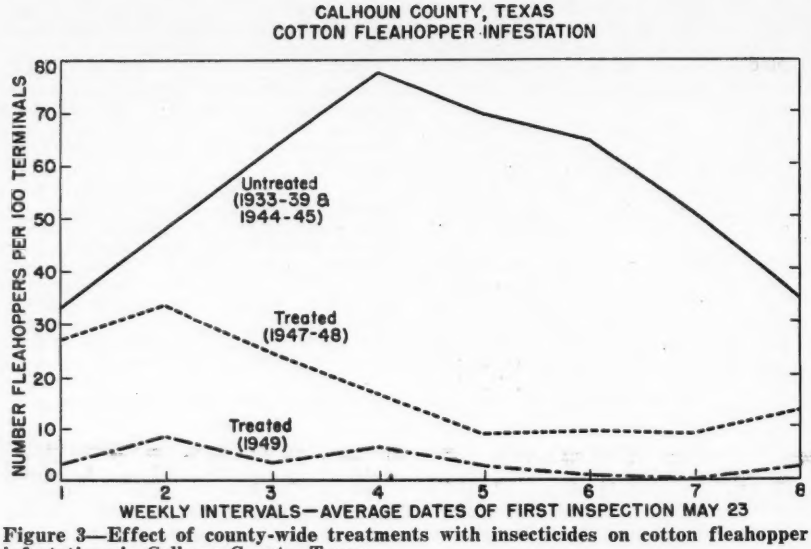

Figure 3—Effect of county-wide treatments with insecticides on cotton fleahopper infestations in Calhoun County, Texas.

obtained with the dusts. In spite of rainy weather during June and July, which was extremely favorable for insect increases, excellent control was obtained on thrips, fleahoppers and overwintered boll weevils. These treatments also gave satisfactory seasonal control of the boll weevil in two-thirds of the fields. Four fields received two late-season treatments for bollworm control. The early-treated cotton retained its early squares and began fruiting heavily several weeks earlier than the untreated cotton, and was ready for harvest approximately three weeks earlier. The seasonal average number of blooms per acre was 4,201 in the treated and 1,044 in the untreated cotton.

• **Gain of 133 Percent in Yield**—The average production of lint cotton was 415 pounds per acre from the treated and 178 pounds from the untreated cotton. This was a gain of 133 percent. After deducting the cost of insecticides and of applying them and after all expenses of picking and ginning the extra cotton, the net profit was $54.42 per acre.

Illustrations of the benefits of county-wide treatments with insecticides is shown in Figures 2 and 3. It is conservatively estimated that 95 percent of the cotton acreage in Wharton County, Texas, received presquare or early season treatment in 1949. Cooperation of farmers over such a large area (approximately 100,000 acres) was due primarily to the aggressiveness of Wharton County Agent Joe Hall, who is a firm believer in early season control of insects. In Calhoun County, Texas, cotton fleahopper infestations were high until 1947, when growers began using DDT or some of the other new insecticides on a county-wide basis. At least 95 percent of the cotton acreage of the county has now been treated. In 1947 and 1948 treatments were begun about two weeks too late for maximum control, but in 1949 they were started earlier.

Experiments on Less Than a Community Basis

In a few experiments at Waco in 1949 early-season applications of insecticides were made on less than a community-wide basis. Plots of two to 16 acres in one field were treated. Initial field populations of overwintered weevils in the Waco area were lighter in 1949 than in 1946. However, since weather conditions were very favorable for weevil multiplication, more insecticides had to be applied and the gains in yield were only about half as great as when entire communities were treated, being only 117 pounds of lint cotton per acre compared with 237 pounds in the former case.

Conclusions

Both early-season application of insecticides and early-fall destruction of cotton stalks are worth while when practiced by individual growers on a single field or farm, but they give much better boll weevil control when practiced on a community-wide basis.

In areas where boll weevils and/or other early-season insects occur in damaging numbers nearly every year, there is no need to wait until infestations build up to high figures before starting the control program. A delayed, emergency program often allows the insects, especially the boll weevil, to get such a head start that they are very difficult to control. For many farmers such a program is not always practical or possible.

Although early-season application of chemicals may not always give seasonal control of weevils, it will usually delay or suppress damaging infestations to such a degree that late-season treatments, when necessary, will give satisfactory and economical control.

• **Recommended General Practices**—The following general practices for cotton insect control are recommended:

(1) Systematic annual presquare or early-season applications of insecticidal sprays or dusts over large areas where insects are known to occur in most years. This practice insures early fruiting and either gives control for the season or delays for several weeks injurious infestations of boll weevils and other early-season insects.

(2) Emergency application of sprays or dusts *if* and *where* necessary, as determined by insect counts.

(3) Early-fall destruction of green cotton stalks before frost *when* and *where* possible, as an aid in controlling or reducing boll weevils the next season.

• Prospective supplies of alfalfa seed in the U.S. are 41 percent larger than last year.

Value of Community Action

WE NEED a community-wide early-season control program. Here a group is being trained to identify insects and to make counts. Eighty-nine percent of the squares in this field were punctured by the boll weevil. The next (third) generation of weevils migrated into nearby fields that had been poisoned early in the season.

Federal Recommendations

(Continued from Page 55)

In general, the mass median diameter of the spray droplets should range from 100 to 300 microns.

For treatment of seedling cotton in most areas it is suggested that with ground equipment one nozzle per row be used to apply the spray and, as the cotton increases in size, the number of nozzles per row be increased. If nozzles are kept at least 10 inches from the plant, the danger of leaf burn is minimized.

For use in ground equipment, it is essential that spray concentrates be diluted immediately prior to use with not to exceed an equal volume of water, and the diluted emulsion then added to the required volume of water.

As a safety measure, it is recommended that the spray boom on ground equipment be located behind the operator.

For airplane spray application, it is suggested that from one to two gallons of spray containing the recommended rate of toxicant be applied per acre. It is essential to use some method of flagging for best results in airplane spraying.

For stability in storage and to prevent breakdown of the formulation when metal containers are used, the containers should be lined with some material that will not react with or cause deterioration of the concentrate. The various formulations made by each insecticide formulator should be prepared in such a way that they may be combined with those of any other formulator and form a stable emulsion.

It is suggested that the formulations contain even multiples of the recommended rates per acre of the insecticide whenever possible. The pounds per gallon of each insecticide in the concentrate should be shown on the label.

Insecticides

• **Aldrin (Compound 118)**—Aldrin, the compound referred to in the report of the Baton Rouge (1948) conference as Julius Hyman 118, was used extensively in experiments in Mississippi and to some extent in some other states for boll weevil control in 1949. It was effective when used as a 2.5 percent dust at the rate of 10 pounds per acre and as a spray at the rate of 0.25 pound per acre. Aldrin will also control the cotton fleahopper, tarnished plant bug, rapid plant bug, some species of cutworms, and thrips. In experiments to date, aphids did not build up following its use. Aldrin will not control the bollworm or red spider mites. It is compatible with all of the new organic insecticides recommended for cotton insect control.

Aldrin is very toxic to animals and is extremely hazardous to handle. It should be handled similarly to parathion until the hazards in connection with its use are better understood.

See Hazards and Precautions in the Use of Insecticides, page 53.

• **Benzene Hexachloride**—Benzene hexachloride will control the boll weevil, cotton aphid, tarnished plant bug, rapid plant bug, cotton leafworm, thrips, southern green stink bug, garden webworm, fall armyworm, cotton fleahopper and grasshopper. It will not control the bollworm, pink bollworm, salt-marsh caterpillar and red spider mites. For this reason, benzene hexachloride alone frequently cannot be successfully employed for over-all cotton insect control. Benzene hexachloride also kills many beneficial insects.

Benzene hexachloride at approximately one-third pound of the gamma isomer per acre (example: 10 pounds of benzene hexachloride dust containing three percent of the gamma isomer) is the minimum rate which has consistently given satisfactory control of the insects against which it is effective. The cotton fleahopper has been controlled with one-tenth pound of the gamma isomer per acre. The most common commercial dust formulations containing benzene hexachloride used by cotton growers for boll weevil control contain three percent of the gamma isomer and five percent of DDT. In areas where red spider mites are a problem, sulfur should be used in the mixture. The insecticide that gives the best control of the pink bollworm and also controls most of the other cotton insects that may be present in the same field is a mixture containing 10 percent of DDT, two percent of the gamma isomer of benzene hexachloride and 40 percent of sulfur applied at the rate of 15 pounds per acre.

When the mixture of five percent DDT and three percent of the gamma isomer of benzene hexachloride is used, an average of 10 pounds of dust per acre is recommended for control of the boll weevil and other insects, except the bollworm. Where the bollworm is also a problem, the rate should be increased to 15 pounds per acre. Applications should usually be made at four- to five-day intervals until the infestation is brought under control. The use of this mixture destroys natural enemies of the bollworm, and this insect may increase rap-

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idly following a premature termination of a dust program. One application of 15 pounds of the mixture per acre may suffice for "knock-out" aphid control. This mixture is also used for the control of the bollworm and is often preferred to 10 percent DDT alone due to the aphid and boll weevil control which can be expected from the mixture.

Sulfur, pyrophillite and non-alkaline clays and talcs have been used as satisfactory diluents for benzene hexachloride.

Benzene hexachloride applied as a low gallonage spray control led the boll weevil in field experiments conducted during 1949. It should be applied at the rate of 0.4 pound of gamma isomer per acre. Proper formulation of the emulsion concentrate is necessary to prevent foliage or plant injury.

Further research is needed concerning the accumulation of this insecticide in the soil following applications to cotton and the resultant effects on other crops. Grain sorghum, Irish potatoes, onions, barley and cowpeas are some of the crops adversely affected by benzene hexachloride.

High temperatures, wind and convection currents greatly reduce the effectiveness of benzene hexachloride for aphid control. Technical benzene hexachloride has an objectionable odor and is irritating to the eyes and nasal passages.

See Hazards and Precautions in the Use of Insecticides, page 53.

• **Calcium Arsenate** — Calcium arsenate is an economical and effective insecticide for the control of the boll weevil and the cotton leafworm. It is used at the rate of 10 to 15 pounds per acre for boll weevil and cotton leafworm control; and 12 to 16 pounds per acre will control bollworms if applications are properly timed and infestations are not too heavy. It is usually used undiluted against the above insects; and when used without an aphidicide, an increase in aphid populations often results. Calcium arsenate has excellent dusting qualities, and is recommended as a standard of comparison with organic insecticides against the cotton insects for which it is effective.

COTTON INSECTS caused many cotton producers in Alabama heavy losses on the 1949 crop; yet, says Dr. F. S. Arant of the Alabama Polytechnic Institute, "some farmers in Alabama made more profit from dusting cotton in 1949 than any other year in the history of cotton insect control."

Special or low lime calcium arsenate is compatible with organic insecticides. When this is mixed with either benzene hexachloride or parathion both the boll weevil and the cotton aphid may be effectively controlled. When mixed with DDT, it is effective against the boll weevil and the bollworm.

Calcium arsenate in certain light sandy soils is injurious to some crops, especially legumes and oats. It should not be used for cotton insect control in fields where rice may be planted. Drifting of the dust may injure other crops. Calcium arsenate is poisonous and should be handled carefully. Livestock should be kept out of dusted fields. Care should be taken to avoid drift when dusting near pastures, especially when airplanes are used.

See Hazards and Precautions in the Use of Insecticides, page 53.

• **Chlordane**—Chlordane will control the boll weevil, cotton fleahopper, tarnished plant bug, grasshoppers and thrips. For the insects against which chlordane is effective, from 0.5 to 1.5 pounds of the technical material per acre is required. Although it kills some weevils in squares and bolls, conflicting results were obtained regarding the practical benefit derived.

In general, the results obtained with chlordane when used at a comparable dosage per acre against the boll weevil were not equal to results obtained with materials usually recommended for cotton insect control. Chlordane did not control bollworms and red spider mites, and, in many instances, these pests increased following its use. When 40 percent sulfur was added to the chlordane dust, red spider mite infestations did not develop. Chlordane failed to control heavy aphid populations. However, injurious aphid infestations did not develop following its use, unless it was mixed with DDT.

The toxicity of chlordane to higher animals is greater than that of DDT. Operators should avoid breathing the dust any more than is absolutely necessary. Contamination of food and feed crops around cotton fields should be avoided.

(Continued on Page 73)

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A Brief History of
Cotton Insecticides and Cotton Insect Control

By R. W. HARNED
Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington, D.C.

COTTON has always been attractive to insects. From the earliest days of cotton production in the United States insect pests have taken their toll. In the early days the insects that attracted the most attention and caused the most damage were the bollworm and the cotton leafworm. Hand picking was the chief method for their control. Hundreds of articles and thousands of pages have been written about these insects during the past 150 years.

Earliest Control Efforts

• **Fires and Torches**—More than a hundred years ago the building of fires around cotton fields and the carrying of lighted torches through the fields were practiced for the purpose of attracting and killing moths. Although much time and money were spent in fighting the moths of the bollworm and the cotton leafworm in this manner, it is doubtful whether any measurable benefit was ever derived from these practices.

• **Road Dust**—Many farmers discovered that road dust settling on cotton plants growing close to dirt roads seemed to protect them from the bollworm and the cotton leafworm. This was especially noticeable early in the season and during periods when the infestations were light. Consequently road dust was distributed over thousands of acres of cotton in the hope of protecting it from the ravages of these insects. However, when they became really abundant the road dust proved to be of little value in checking their depredations.

Solutions containing common salt were also often sprinkled or sprayed on cotton plants. These solutions disturbed the insects and apparently gave some protection to the plants during periods of light infestations. However, they were of little benefit when the insects became really abundant.

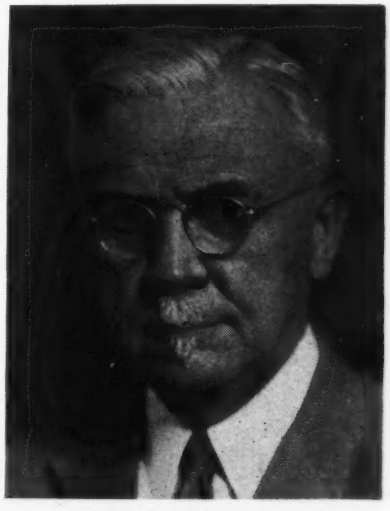
A MERE HANDFUL of our readers may recall when paris green was first used to control cotton insects and a number of them will remember when arsenate of lead made its initial appearance. But none of us was around to witness the practice of building fires and carrying torches through the fields to attract and kill moths.

The First Insecticides

• **Paris Green** — Paris green was the first insecticide to be effective in cotton insect control. It had been used against the Colorado potato beetle prior to 1872, when Professor C. V. Riley, then state entomologist of Missouri and later chief entomologist of the United States Department of Agriculture, recommended its use for the control of the cotton leafworm. During the next 40 years thousands of tons of paris green were used for control of the cotton leafworm and the bollworm in the Gulf Coast states. London purple and several other mixtures containing arsenic were also widely used during this period, but none of them was so satisfactory as paris green.

• **Arsenate of Lead**—During the first decade of this century arsenate of lead, which had been developed for the control of fruit insects, was widely used for the control of cotton insects. The boll weevil came to the United States in 1892, and was soon recognized as the most serious insect pest of cotton. Probably every insecticide or chemical that had ever been used against other insect pests of plants was tested against the boll weevil. Paris green was the first to be used extensively. Lead arsenate was used as a spray to some extent for boll weevil control. However, arsenicals were found to be more effective as dusts than as sprays against the weevil, and so lead arsenate was produced in dust form especially for use against this insect. Prior to 1916 lead arsenate dust was recognized as the most effective insecticide for boll weevil control.

• **In 1916: Calcium Arsenate**—In 1916 the discovery was made that calcium arsenate dust of certain specifications was even more effective against the boll weevil than was lead arsenate. As calcium arsenate had good dusting qualities, was relatively inexpensive and was highly effective in controlling the boll weevil, it soon became one of the most popular insecticides ever used. For the next 25 years an average of 50 million pounds of this insecticide was used annually for the control of the boll weevil and other cotton insects.



R. W. HARNED

• **Airplanes First Used in 1922** — The need for applying calcium arsenate to large acreages of cotton stimulated interest in the improvement of dusting machines, but no ground machines could be used satisfactorily when the ground was wet. In 1922 airplanes were first used for the application of calcium arsenate to cotton. This method was so satisfactory that within a few years several dozen companies were operating hundreds of airplanes largely for dusting cotton. Airplane dusting has increased since the war until there are now several hundred companies or individuals engaged in crop dusting and several thousand airplanes are used for this purpose.

• **Sulfur and Nicotine** — During the 1920's sulfur dust and nicotine were first

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used extensively for the control of cotton insects. Although sulfur had long been known as an insecticide, it was not used extensively on cotton until it was found to be helpful in reducing the infestations of the red spider mite and the cotton fleahopper. Later, sulfur was found to be useful in reducing infestations of several other cotton insects. Mixtures of sulfur with calcium arsenate or paris green were found to be even more effective than sulfur alone, when used against the cotton fleahopper and some other insects that attack cotton. During the past 15 years many millions of pounds of these mixtures have been dusted on cotton, especially in Texas, Arizona, New Mexico and California.

• **The Aphid Becomes a Major Problem**—The cotton aphid had been considered a minor pest of cotton until about 1920.

A GOOD JOB of defoliation goes a long way to control insects. Complete defoliation not only removes leaves but it gets small bolls, squares and blooms and forces the weevil to go into hibernation in such a weakened condition that he has a poor chance of surviving the winter.

Then the extensive use of calcium arsenate for boll weevil control caused it to become a major problem. Nicotine was found to be fairly satisfactory for the control of the cotton aphid. It is generally used in the form of nicotine sulphate, which is mixed with calcium arsenate or lime and dusted on the cotton.

During the 1930's the insecticides widely used for the control of cotton insects were calcium arsenate, sulfur, lead arsenate, paris green, nicotine sulfate and mixtures of these materials. During this decade several promising insecticides for cotton-insect control were discovered, but were not used extensively because of the cost or because other insecticides seemed to be superior. Among the materials developed during the 1930's were mixtures of basic copper arsenate and sulfur, effective in the control of the bollworm, the cotton fleahopper, the boll weevil, the cotton leafworm and other insects; cyrolite, effective against the bollworm; rotenone, against the cotton aphid; and sabadilla, against stinkbugs and plant bugs.

The Newer Insecticides

• **DDT: First to Attract World-Wide Attention**—Since 1940 many new and promising insecticides have been developed for cotton-insect control. They are chiefly synthetic organic chemicals. DDT was the first to attract world-wide attention. It was first tested against cotton insects in 1943. It is now used especially for the control of the bollworm and the pink bollworm. It appears to have little or no value for the control of the boll weevil, the cotton leafworm and the cotton aphid. However, it is effective against the cotton fleahopper, the tarnished plant bug and some of the stinkbugs, thrips and other insects that attack cotton.

• **Benzene Hexachloride** — Next came benzene hexachloride. In 1945 it was

found to be highly effective for the control of the boll weevil, the cotton leafworm, the cotton aphid and other insects, and to have little or no value against the bollworm, the pink bollworm and spider mites. In 1946 mixtures of DDT and benzene hexachloride were discovered to be more effective against most of the cotton insects than any insecticide that had been used on cotton. Mixtures of these materials seem to be effective against all the insect pests of cotton in the United States, but are not effective against the spider mites. As spider mites are serious pests in many areas, it is necessary to add sulfur to the mixtures to make an all-purpose formulation. The formulation that is now probably more widely used on cotton than any other is a mixture that contains five percent of DDT, 40 percent of sulfur and sufficient benzene hexachloride to give three percent of the gamma isomer. This is known to the farmers and insecticide dealers as the 3-5-40 mixture.

• **Then Toxaphene**—Toxaphene was the next insecticide that was found to be highly effective for the control of cotton insects. It is toxic to the boll weevil, the bollworm, the cotton fleahopper, the cotton leafworm, the tarnished plant bug, the rapid plant bug, the southern green stinkbug and thrips, but does not kill spider mites. Millions of pounds of mixtures containing toxaphene are now being used each year. The materials from which toxaphene is made come from old pine stumps and salt water. The formulas usually recommended contain 20 percent of toxaphene and are applied so that two pounds of toxaphene is distributed to each acre of cotton. In areas where the spider mite is likely to be injurious the dust mixtures containing toxaphene should also include 40 percent of sulfur.

• **Chlordane**—Chlordane is another synthetic organic insecticide that has been widely used in some states, especially for the control of the boll weevil, grasshoppers, thrips, the cotton fleahopper and the tarnished plant bug. Mixtures of chlordane and DDT are widely used, and to control spider mites 40 percent of sulfur is added.

• **. . . And Many Others**—Heptachlor, lindane, methoxychlor, parathion, tetraethyl pyrophosphate, aldrin and dieldrin are among the other promising organic insecticides for cotton-insect control. Some of them are now being used extensively, while others are still in the experimental stage. More research is needed to determine the place of all these materials in cotton-insect control. Some of them will probably be mixed with other insecticides for general use, some will be used for the control of certain insects, and still others are likely to compete with the general insecticides (DDT, benzene hexachloride, toxaphene, chlordane and calcium arsenate), and be widely used against cotton insects.

• **Outlook for the 1950's**—Chemists and entomologists working together have discovered many other organic materials that are toxic to insects and spider mites. The present outlook is that during the 1950's as many valuable insecticides will be discovered for use against cotton insects as were discovered during the 1940's.

State Recommendations

(Continued from Page 50)

ton have not been destroyed by it, as the case with calcium arsenate. If washed off in less than 10 hours, repeat immediately; from 10 to 24 hours repeat the third day.

2. **Compound 118 (Aldrin).** This was used in boll weevil control experiments in Mississippi in 1948 and 1949, extensively the latter year. A mixture containing 2.5 percent Compound 118 and five percent DDT at 10 pounds per acre will control bollworm, the boll weevil, the cotton fleahopper, tarnished plant bug, rapid plant bug, some species of cutworms and thrips. Thrips and fleahoppers may be controlled with as little as five to eight pounds per acre. In experiments to date, aphids did not build up following its use. Compound 118 is compatible with all of the new organic insecticides recommended for cotton insect control. This is one of the newer organic poisons and should be handled with caution until the hazards in connection with its use are better understood. If washed off in less than 10 hours repeat immediately; from 10 to 24 hours repeat the third day.

3. **Toxaphene.** A dust containing 20 percent toxaphene at 10 to 15 pounds per acre will control the boll weevil, bollworm, fleahopper, thrips, grassworm, leafworm, cutworms, grasshoppers and rapid and tarnished plant bugs. Thrips and fleahoppers may be controlled with as little as five to eight pounds 20 percent toxaphene per acre. The cotton aphid will not develop injurious infestations if toxaphene is used throughout the season. It

COTTON INSECT CONTROL

COTTON GROWERS in 1949 suffered the worst boll weevil infestation in history. In almost every instance, those who made a profit on the crop fought the weevil with insecticides, often applied by airplanes.

Learning a hard lesson, a majority of cotton growers in the future will incorporate as plantation routine a program of LOSS PREVENTION through the use of insecticides correctly formulated and properly applied. The sound logic of such planning will be proven by the avoidance of crop damage and the economies effected by savings made in the costs of chemical and application service, contracted for in off-season periods.

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will not control heavy aphid infestations and cannot be alternated with calcium arsenate because of the danger of aphid increase. Toxaphene is poisonous to livestock and poultry and will kill fish in ponds dusted by airplane or receiving drainage from treated fields. If washed off in 24 hours it should be repeated.

4. **Special calcium arsenate - 2 percent benzene hexachloride mixture.** This is a neutral or low-lime calcium arsenate containing two percent gamma benzene hexachloride. It may be alternated with regular calcium arsenate. If bollworm trouble develops following this schedule, the benzene hexachloride-DDT mixture previously mentioned should be used. If washed off in 24 hours it should be repeated.

Liquid Insecticides Suggested for 1950

Emulsifiable concentrates of gamma benzene hexachloride, toxaphene, Compound 118, chlordane and DDT, as well as combinations of these, will be available in 1950. The amount of insecticide will vary from two to eight pounds of toxicant per gallon, therefore the grower should know the actual pounds present to determine the quantity to use per acre. The amount of spray per acre will vary with the type, make and speed of equipment. With tractor-mounted equipment, one to three gallons per acre will usually give good control. It is necessary to use small nozzle openings (0.02 inch), a pressure of 30 to 40 pounds, and a tractor speed of over three miles per hour. Tractors used in late-season spraying should have fender guards.

The following suggestions are offered for available insecticides:

1. **Gamma benzene hexachloride.** Use this material at rates varying from 1/10 pound per acre with a single nozzle at 30 pounds pressure for thrips and cutworms on seedling cotton to 4/10 pound per acre with three nozzles at 40 pounds pressure in July for weevil control. For bollworms add ½ pound technical DDT per acre.

2. **Toxaphene.** This should be used at rates varying from 7/10 pound per acre for thrips and cutworms on cotton just out of the ground to 2½ pounds technical material per acre for weevils in July and August. For bollworms add ¼ pound technical DDT per acre.

3. **Compound 118 (Aldrin).** For thrips and cutworms on cotton just up, only 0.07 pound per acre is required but this should be increased to ¼ pound per acre by July for boll weevil and other pests. For bollworms add ½ pound technical DDT per acre.

Other Insecticides

1. **Chlordane.** Chlordane has been effective against the boll weevil in some states but has not given consistent control throughout the Cotton Belt. In Mississippi, large quantities of a dust mixture containing one percent gamma BHC, five percent chlordane and five percent DDT were used in 1949 and gave satisfactory control of the major cotton insects. In late season a rate of 12 to 15 pounds per acre is necessary.

As a spray, this should be applied at the rate of 3/10 pound technical chlordane per acre for thrips and cutworms on cotton just up and one pound per acre in mid-summer and late season for boll weevil and other insects. For boll worm add ½ pound technical DDT per acre.

2. **Compound 497 (Dieldrin).** This is a new material which has been tested extensively only during 1949. It is highly effective against the boll weevil and most other cotton pests, except the cotton aphid, garden webworm and a red spider mite. It kills a larger portion of immature weevils in squares than any other insecticide tested thus far and is considered very promising for cotton insect control. Its use during 1950 is suggested on an experimental basis. It is apparently very poisonous to man and should be handled with caution.

3. **Parathion.** This is a very effective material against aphids and red spiders. Calcium arsenate containing one percent parathion has given excellent control of the boll weevil and prevented any aphid injury when used throughout the season. At the one percent strength, parathion

■ **Many farmers report that defoliation gives a marked reduction in boll weevil damage to top bolls . . . and the timing of their defoliation is often influenced by the boll weevil situation in their particular fields. Apparently the weevils are either killed or leave the fields when deprived of leaf protection.—Tildon Easley, agriculturist, American Cyanamid Company.**

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dust is believed to be safe for field use if the operator makes every effort to stay out of the dust. It is not recommended for general use except where strict precautions are observed. Atropine is an effective antidote and should be available instantly wherever it is used.

(For additional information write any of the following: E. W. Dunnam, U.S. Department of Agriculture, Leland, Miss.; A. L. Hamner, Mississippi Experiment Station, State College, Miss.; Clay Lyle, State Plant Board, State College, Miss.; L. C. Murphree, Mississippi Extension Service, State College, Miss.)

Control of Insects in—

• Missouri

The cotton crop in Missouri in 1949 was generally not as productive as in several preceding years. Production figures for 1949 show that only 460,000 bales of lint cotton were harvested, yielding 194,000 tons of seed. The total crop was estimated to be worth $75,500,000. The reduction in yield was due principally to very poor growing conditions, the early part of the season being wet and very cool.

No insect problems of any magnitude arose during the 1949 season. Although the migration of cotton boll weevil was reported to have reached northern Arkansas no weevils were found in any of the cotton producing counties in Missouri.

Cotton growers in Missouri should pay close attention to the columns headed "Begin Treatment" and "Comments" on the following insecticide recommendations to be sure that the infestation is heavy enough to justify treatment. The importance of systematic and careful surveys of cotton to determine the kind and numbers of insects present can hardly be over-emphasized. Timeliness and thoroughness of application are extremely important in the control of insects on cotton.

Although no major insect outbreak on cotton is anticipated for the 1950 season, the recommendations that follow are made for the guidance and help of producers in case an infestation should develop.

■ EVERY TIME an insect destroys a boll of cotton a ginner and a cottonseed crusher lose cotton to gin and seed to crush. That is why ginners and crushers have just as big a stake in effective insect control as the farmer.

Insect indentification is frequently rather difficult for growers; therefore if there is any doubt as to what kind of insects have been found, specimens sent to the Department of Entomology at Columbia, Mo., either through the county agent or direct to the College, will receive prompt attention.

(For additional information, write the Department of Entomology, College of Agriculture, University of Missouri, Columbia, Mo.)

Control of Insects in—

• New Mexico

The New Mexico Extension Service offers the following information to aid the cotton farmers in planning a safe and economical cotton insect control program for the 1950 season. Particular attention should be given to the "Hints and Precautions." Remember, as insect infestations vary so your choice of insecticides, rates of application, etc., will vary. If you are in doubt as to the proper insecticide, consider these points: (1) Does the effectiveness of the insecticide justify its price? (2) Is the insecticide you wish to use available locally? (3) How toxic to plants and animals is the insecticide? (4) Would the use of the insecticide contaminate other crops in the area? *If in doubt as to what insecticide to use, when to use it and how to apply it, contact your county extension agent.*

Be sure insect populations in your cotton field are high enough to demand

Missouri Agricultural Experiment Station—Cotton Insecticides—1950

(Listed in order of preference)

Insects	Begin Treatment	Dust	Spray	Rate of Application	Comments
Armyworms and cutworms	When one or two worms per linear foot of row are found or when migration into field occurs.	20% Toxaphene	40% Wettable Toxaphene or 25% Toxaphene Emulsion	10 lbs. per acre 5 lbs. per acre 1 gal. per acre	These insects seldom attack cotton in Missouri. Make careful surveys to be sure an infestation exists before treating.
Grasshoppers	When large numbers of nymphs appear on the hatching beds or when 4 or 5 hoppers per square yard occur generally over the field.	20% Toxaphene 10% Chlordane	40% Wettable Toxaphene or 25% Toxaphene Emulsion 40% Wettable Chlordane or 25% Chlordane Emulsion	10 lbs. per acre 10 lbs. per acre 5 lbs. per acre 1 gal. per acre 2½ lbs. per acre 2 qts. per acre	The best time to treat is before the young hoppers leave the hatching beds early in the season. They are much harder to control when they are grown and can fly.
Aphids	When curled leaves or honey dew or both appear on plants.	3% Nicotine 20% Toxaphene plus 40% Sulfur 3-5-40 mixture*	50% Wettable BHC (6% gamma)	10-15 lbs. per acre 2 lbs. per acre thorough coverage 10-15 lbs. per acre 10-15 lbs. per acre	Usually not a problem in Missouri. Localized outbreaks may occur in wet seasons. This species is the same as the one which attacks melon crops.
Fleahopper Tarnished plant bug Rapid plant bug Stink bug Other lygus bugs	When infestations appear.	20% Toxaphene plus 40% Sulfur Sulfur	50% Wettable DDT plus Microfine Wettable Sulfur	10-15 lbs. per acre 10-15 lbs. per acre 2 lbs. DDT plus 2 lbs. Sulfur per acre, thorough coverage	Treatment normally will not be profitable unless 25 to 30 fleahoppers or lygus bugs or stink bugs per 100 terminals are present.
Red Spider	When leaves begin to show injury.	Sulfur	Wettable Microfine Sulfur	10-15 lbs. per acre 2 lbs. per acre thorough coverage	Extremely thorough coverage of the under sides of the leaves is essential. Sulfur should be included in all applications of insecticides to cotton in Missouri to avoid build up of red spiders.
Bollworm (Corn Ear Worm)	When eggs and four or five worms are found per 100 terminals. Continue at 5-day intervals until infestation is under control.	20% Toxaphene plus 40% Sulfur 3-5-40 mixture*	40% Toxaphene	10-15 lbs. per acre 10-15 lbs. per acre 2-3 lbs. per acre	Applications should be carefully timed and thorough coverage obtained. Normally, enough corn is in silk in Missouri to keep the worms on the corn. Careful survey of the infestation should be made to determine need for treatment.
Leafworm	When worms appear early. Repeat at 5-day intervals.	20% Toxaphene plus 40% Sulfur 3-5-40 mixture*	40% Toxaphene	10 lbs. per acre 10 lbs. per acre 2 lbs. per acre	Leafworm in Missouri seldom a problem serious enough to warrant treatment. Late season worms may be beneficial as defoliators.

*3-5-40 mixture consists of 3% gamma BHC, 5% DDT, and 40% Sulfur.

Caution: Do not attempt to apply sprays listed above with a weed sprayer since the nozzles will not accommodate wettable powders. Insecticides should be in the form of emulsions only if applied through a weed sprayer.

insecticide application and do not make application just because someone else in the vicinity is doing so. Frequent examination of your cotton field should be made to determine the injurious insects present. *Learn to conduct cotton insect surveys in your own field.*

Success in controlling cotton insects is directly dependent upon timeliness of application and thorough coverage of plant throughout the period of insect infestation.

Dusting

Any mechanically sound cotton duster (hand machine, ground machine or airplane) may be used to apply insecticides for cotton pest control. Complete coverage is essential regardless of equipment used. If airplane application is made, remember that the dusting swath should not be wider than the width of the plane's wings (generally the width of 10 to 12 rows) and the swaths should meet or overlap. Use a flagman to aid in proper and efficient airplane application. *Never depend on drift for coverage.* Dust should be applied when air is calm or nearly so.

Spraying

Except for applying insecticides for the control of insects on young or seedling cotton, spraying will not be generally recommended in New Mexico until more experimental evidence is available concerning equipment, formulations, etc. In general, spraying appears to be as effective as dusting against certain cotton insects when the same amount of technical material is applied per acre per application. Should ground equipment be used, sprays may be effectively applied any time wind velocity does not exceed 15-20 miles per hour. If airplane equipment is used, wind velocity should not exceed 10 miles per hour for best results.

NOTE—Forty percent (or more) conditioned dusting sulfur is recommended for use in all cotton dusts in each and every application. The inclusion of sulfur in the cotton dust mixture is recommended for the control (and/or suppression) of red spiders.

For the control of the most common pests which may infest cotton in New Mexico, the use of one of the following listed insecticides is recommended. An insecticide combination may be used if one insecticide will not control all insects present.

• **Bollworm**—Ten percent DDT plus 40 percent (or more) sulfur; or 20 percent toxaphene plus 40 percent (or more) sulfur.

These insecticides are to be applied at the rate of 15-20 pounds per acre per application; repeat as necessary at four-five day intervals until infestation is under control. Application should be made when four-five small worms are found per 100 terminals.

• **Fleahoppers, Lygus Bugs (Tarnished Plant Bugs), and Rapid Plant Bugs** — Five percent DDT plus 40 percent (or more) sulfur; or 20 percent toxaphene plus 40 percent (or more) sulfur.

These insecticides are to be applied at the rate of 15-20 pounds per acre per application.

When eight-10 sucking insects are collected per 100 sweeps with a 16 inch sweeping net, one of the above insecticides should be applied at weekly intervals until such time as the infestation is under control.

Aphids—Three percent gamma benzene hexachloride plus 40 percent (or more) sulfur; or 20 percent toxaphene plus 40 percent (or more) sulfur; or two-three percent nicotine dust.

These insecticides are to be applied at the rate of 15-20 pounds per application. Toxaphene will usually prevent an aphid build-up if used throughout the season but will not "knock-out" or control heavy infestations. Nicotine should be applied when air is calm with no dew on plants. Complete coverage is necessary. Aphids may be present in injurious numbers on seedling cotton and again late in the season on maturing cotton. (If aphids are injurious on seedling or young cotton, spraying is recommended.)

• **Thrips** — Five percent DDT plus 40 percent (or more) sulfur, or 20 percent toxaphene plus 40 percent (or more) sulfur.

These dusts are to be applied at the rate of 15-20 pounds per acre per application. (If thrips are injurious on seedling or young cotton, spraying is recommended.)

• **Stinkbugs**—Two percent gamma benzene hexachloride plus five percent DDT plus 40 percent (or more) sulfur; or three percent gamma benzene hexachloride plus 40 percent (or more) sulfur; or 20 percent toxaphene plus 40 percent (or more) sulfur.

These insecticides are to be applied at the rate of 15-20 pounds per application as needed for control.

• **Leafworm**—Three percent gamma benzene hexachloride, plus 40 percent (or

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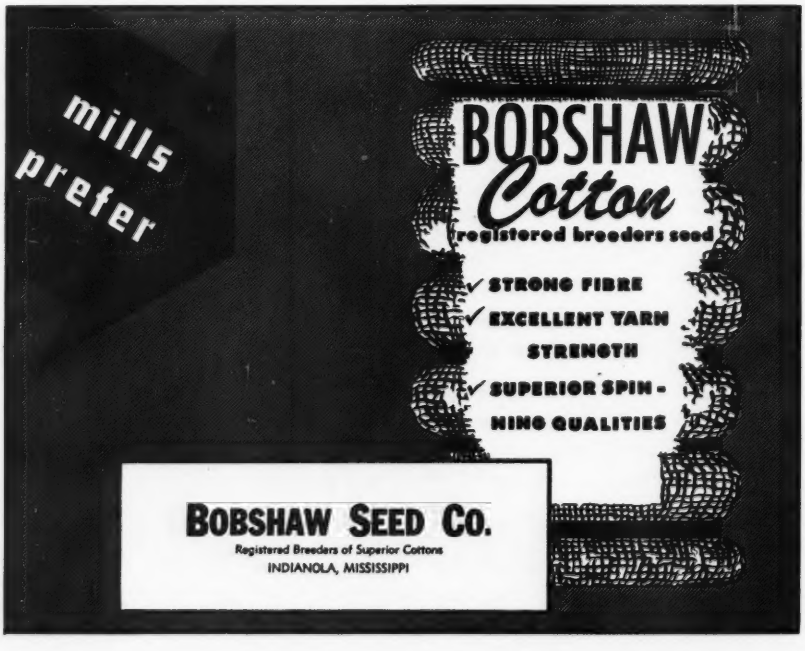


more) sulfur; or 20 percent toxaphene plus 40 percent (or more) sulfur.

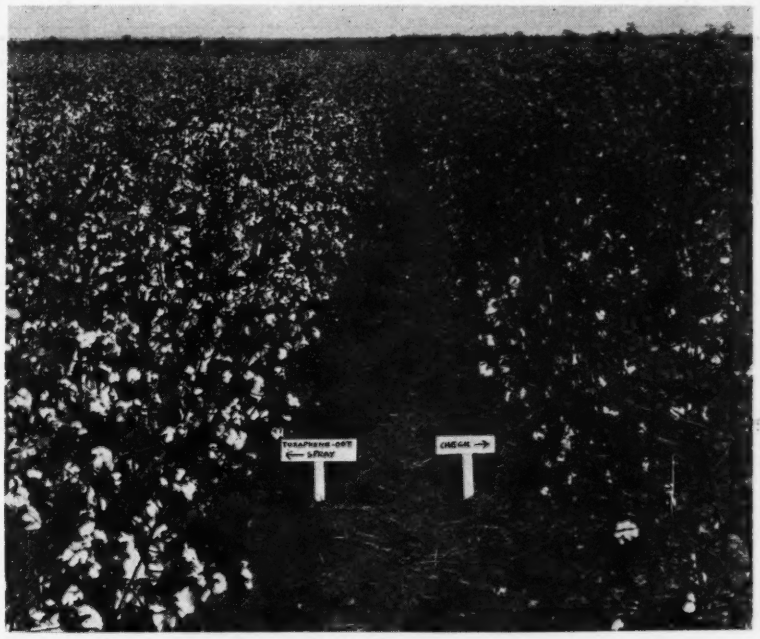
These insecticides are to be applied at the rate of 10-15 pounds per acre per application when worms appear in the field.

• **Red Spider**—Forty percent (or more) conditioned dusting sulfur in each insecticide application made in the cotton field, *or when sulfur resistant strains of red spider are encountered,* use one percent parathion at the rate of 25-30 pounds per acre per application (note precautions on use of parathion).

• **Pink Bollworm**—Cultural control such as destruction of stalks and regulated planting dates as recommended by the Pink Bollworm Division of the Bureau of Entomology and Plant Quarantine may be supplemented by use of the following insecticides if the infestation warrants additional control:

Ten percent DDT plus 40 percent (or more) conditioned dusting sulfur applied at the rate of 15-20 pounds per acre per application at approximately weekly intervals until infestation is under control. (If there is any doubt in your mind about pink bollworm infestations, contact your county extension agent or the extension entomologist at your earliest convenience.)

(For additional information, write Edwin J. O'Neal, Entomologist, Agricultural Extension Service, New Mexico State College, State College, N. M.)



This Proves: We Can Kill Insects

COTTON on the left received 8 applications of toxaphene-DDT spray emulsion for bollworm control and yielded 1,818 pounds of seed cotton per acre. Cotton on the right was not treated and yielded only 689 pounds of seed cotton per acre. (Texas Agricultural Experiment Station experiments, 1949).

Control of Insects in—

• North Carolina

Control Program

Many factors enter into an adequate control program. Lack of equipment, poor application of insecticides and improper timing of treatments can affect control work. Rainy conditions can favor increase in development of the pest and excessive rains can wash off the insecticide making it necessary to repeat within 24 to 48 hours. On the other hand, temperatures of about 10° F above zero will kill many overwintering weevils, and thus reduce early season damage. Migration of weevils during the latter part of the season may make it necessary to apply materials to protect late bolls. Little can be done to change many of the factors mentioned above, but growers can plan operations, study seasonal developments and survey reports and apply insecticides at the best possible time.

Use of Poisons

Calcium arsenate cannot be used in many parts of the state because of light soils. Mopping the plants with the molasses-calcium arsenate mixture as a pre-square insect control program requires too much labor to justify its use. More effective insecticides are available now. They will kill by contact as well as when eaten. Several applications of poisons may be necessary when the infestation is high.

Timing of Applications

The boll weevil emerges from wintering quarters over a long period of time. Some weevils appear while the cotton is small. Others will not show up until after the first squares appear. The use of a few rows as a trap crop planted early to attract the first weevils may be helpful. Too, especially in the upper Piedmont and northern part of the state, spot dusting of localized infestations may be practiced. For high yields one must protect both early and late bolls. During some seasons the late cotton is seriously damaged by second brood migrating weevils. During 1949 from three to seven applications on the average were necessary for high yields giving about a bale of cotton per acre. Best control was obtained when the treatments were started just after the first squares appeared about June 15 in southern counties and continued into August with two to three late applications being made in the worst infested areas. County agents can advise regarding seasonal developments and weevil conditions. State wide surveys will be made throughout the season.

Application of Materials and Equipment

Some growers do not have equipment and must depend on a joint arrangement with a neighbor or a custom operator. Unless a careful plan is worked out, applications may be delayed. While most of the recommended dust insecticides can be purchased as a spray emulsifiable concentrate, dusts will no doubt be used generally. Sprays containing the same degree of insecticide per acre as in dusts have proved equally effective. While sprays can be applied as a rule during the day, other factors must be considered. Location of water and time required to refill spray tank may be a factor on some farms. Spray equipment is fairly expensive, and it must be mounted properly on a tractor if it is to give good service. Nozzle arrangement per row is very important. Three nozzles per row are considered best for treatment of mature cotton. One nozzle per row will be sufficient for treatment when plants are small. Wheel guards or special shields may be used to protect plants when applying insecticides. Because of the many

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Recommendations for the Control of Cotton Insects in North Carolina

Insects	Insecticides	Application
1. Boll Weevil	3% gamma BHC[1]-5% DDT	Where weevils are a problem each year make 3 applications, 6-8 pounds per acre, at 5-7 day interval starting when squaring begins; watch conditions and if infestation rises to 10% make 2 or 3 additional applications using 10-15 pounds per acre at 5 day intervals.
	or	
	20% Toxaphene	Same as above.
	or	
	10% Chlordane-5% DDT[2]	Same as above.
2. Aphid (Plant louse)	3% gamma BHC-5% DDT	10 pounds per acre, at 5 day intervals, for heavy infestation. Usually one application will bring pests under control. May need to be applied very early. Treatment for boll weevil should hold population in check.
3. Thrips	3% gamma BHC-5% DDT	10 pounds per acre, as necessary (control usually achieved when dusting for other insects).
	or	
	20% Toxaphene	Same as above.
	or	
	DDT	Same as above.
4. Fleahopper, Plant Bugs	3% gamma BHC-5% DDT	Same as above.
	or	
	20% Toxaphene	Same as above.
	or	
	5% DDT	Same as above.
5. Bollworm	3% gamma BHC-5% DDT	8-10 pounds per acre, at 5 day intervals, when 4-5 worms are found per 100 terminals.
	or	
	20% Toxaphene	Same as above.
6. Red Spider	Sulfur	20 pounds per acre in case of outbreak (control usually achieved where sulfur is included with BHC, toxaphene or chlordane).
7. Leafworm	3% gamma BHC-5% DDT	10 pounds per acre, as necessary (control usually achieved when dusting for other insects).
	or	
	20% Toxaphene	Same as above.

[1]Technical grade benzene hexachloride containing 3% of the gamma isomer or 3% lindane.
[2]Experimental results have been variable. In some areas quite effective.

factors involved, no general recommendation can be given for spray mixtures at present.

Airplane applications have proved satisfactory when the proper intervals between treatments have been maintained and when proper distribution of the insecticides was carried out. The swath width should be no greater than the wing span. Some poor results have been reported. Careful planning and study of each field should be made as many fields are too small and trees or electric lines may present serious hazards.

• **Caution**—The newer organic insecticides in use today are more efficient than some of the ones used formerly. Users and handlers should observe strict precautions at all times. When used properly they do not present a hazard to man, animals or plants.

(For additional information, write George D. Jones, Extension Entomologist, North Carolina Extension Service, North Carolina State College, State College Station, Raleigh, N. C.)

Control of Insects in—

• Oklahoma

DDT will control the bollworm but is ineffective in controlling the cotton boll weevil. Benzene hexachloride will control the boll weevil and not the bollworm. Chlorinated camphene (toxaphene) will control both the boll weevil and bollworm but may permit a red spider infestation unless the dust contains at least 40 percent sulfur.

Chlordane, another of the new organic insecticides, has been tested only on a limited scale for the control of cotton insects. Some of these tests show fair control; however, more information is needed as to dosages required before this insecticide can be recommended for general use.

Parathion (Thiophos 3422) shows promise as an insecticide for the control of cotton aphids and fleahoppers. It is highly poisonous and is not recommended for general use at the present time.

Calcium arsenate, which has been used for boll weevil control for more than 25 years, is recommended as one of the important cotton insect control insecticides in 1950. It is used as a standard insecticide of comparison with the new insecticides.

Calcium arsenate will not control the bollworm and often causes heavy aphid build-up.

CALCIUM ARSENATE

• **For Boll Weevil Control**—1. For pre-square treatment—Apply at the rate of five pounds per acre when weevils are present at the rate of 100 per acre. ALL DUST APPLICATIONS SHOULD BE MADE WHEN THE AIR IS CALM. THIS APPLIES TO ALL INSECTICIDES RECOMMENDED.

2. For square protection—Apply when square infestation is 10 percent or above at the rate of five to seven pounds per acre. Applications should be made at four- to five-day intervals until weevils are under control. Usually two to three applications will be sufficient. If washed off in 24 hours, repeat application.

• **For Leafworm Control**—Apply at the rate of seven to 10 pounds per acre. One application is usually sufficient.

DDT

• **For Bollworm Control**—Use a 10 percent dust and apply at the rate of 10 to 15 pounds per acre.

Apply when worms are small and before they enter the bolls.

APPLY WHEN THE AIR IS CALM.

Two or more applications may be required for control.

DDT may cause heavy aphid population.

Do not mix DDT with calcium arsenate, lime, or other alkaline materials.

BENZENE HEXACHLORIDE

• **For Boll Weevil Control**—Use benzene hexachloride containing five percent gamma isomer applied at the rate of 10 pounds per acre.

This will control the boll weevil, but often permits the bollworm to build up in damaging numbers and the entire crop of bolls may be destroyed.

RECOMMENDED ONLY WHERE BOLLWORM IS NOT A PROBLEM.

CAUTION: Benzene hexachloride should not be used where peanuts or root crops follow cotton the next year for often an objectionable taste is given these crops.

BENZENE HEXACHLORIDE (3% gamma isomer), 5% DDT and 40% SULFUR MIXTURE

• **For Boll Weevil Control** — Apply this mixture at the rate of 10 pounds per acre when the square infestation is 10 percent or above.

Apply at five-day intervals when the air is calm until weevils are under control.

• **For Bollworm Control** — Apply this mixture at the rate of 10 pounds per acre when the bollworms make their first appearance and before they have entered the cotton bolls.

This (1950) season we are recommending two (2) early applications of the 3-5-40 dust, or the 20 percent toxaphene plus 40 percent sulfur. The first application should be made soon after the squares start forming but before they are large enough for the boll weevil to puncture. The second application should be seven days later. Apply at the rate of ten (10) pounds per acre. These early applications are intended to kill the over-wintering weevils that have emerged from hibernation before they have had time to deposit eggs on the new squares. Moisture on the cotton plants is not necessary when the new insecticides are used. They can be applied at any time of the day or night when the air is calm.

FOR CONTROL OF COTTON APHID, COTTON FLEAHOPPER, PLANT BUG, LEAFWORM, ETC.

When field is treated with above mixture for either boll weevil or bollworm control, these insects will be controlled.

Do not mix benzene hexachloride (three percent gamma isomer), five percent DDT and 40 percent sulfur mixture with calcium arsenate, lime or other alkaline materials.

CHLORINATED CAMPHENE

• **For Boll Weevil Control**—Use a 20 percent dust and apply at the rate of 10 pounds per acre.

Apply at five-day intervals when the square infestation is 10 percent or above.

APPLY WHEN THE AIR IS CALM.

• **For Bollworm Control**—Use a 20 percent dust and apply at the rate of 10 pounds per acre.

Apply when the worms first make their appearance and before they enter the bolls.

• **For Leafworm Control**—Use a 20 percent dust and apply at the rate of 10 pounds per acre.

One application is usually sufficient.

Do not mix chlorinated camphene with calcium arsenate, lime or other alkaline materials.

NICOTINE

• **For Aphid Control** — Three percent nicotine mixed with an alkaline diluent can be used to "knock out" heavy infestations of cotton aphids if properly applied. Two percent of nicotine in alternate applications of calcium arsenate or one percent nicotine in all applications of this material will prevent a cotton aphid build-up, if properly applied. Apply when the air is calm and the temperature is 70° F., or above. If applied by airplane, the plane must be flown low just above the cotton plants and the swaths should not be wider than the wing spread of the plane, which is usually 30 or 40 feet.

SPRAYS

One test run in Oklahoma using a spray mixture containing an emulsifiable concentrate containing four pounds of toxaphene and two pounds of technical DDT per gallon, used at the rate of three to four pints per acre, gave approximately the same yields as where 3-5-40 dust or 20 percent toxaphene plus 40 percent sulfur was used. Spray tests conducted by farmers using the same material, in general, were not satisfactory and many of them had to finish the season with dust.

HOW TO DETERMINE THE NUMBER OF BOLL WEEVILS PER ACRE

• **For Pre-Square Treatment** — Examine all plants on 100 linear feet of row.

The row should be selected near the center of the field and plants examined at three points on the row.

These points should be near each end of the field and in the middle.

When one, or more, weevils are found in this space, pre-square applications should be applied.

• **For Square Protection** — To determine the number of punctured squares, walk diagonally across the center of the field picking 100 squares as you walk. These squares should be half grown or larger and an equal number should be picked from the top, middle and lower branches of the plants.

After picking 100 squares, examine them for weevil injury.

Record both egg punctures and feeding punctures as damaged squares.

The number of squares damaged will give you the percentage of infestation when 100 squares are examined at each point.

PINK BOLLWORM

The pink bollworm, one of the worst insect enemies of cotton, was found for the first time in Oklahoma in November 1947.

The pink bollworm does not occur in large enough numbers in the state to warrant control measures by the use of insecticides. The best method of controlling and eradicating this pest is to sterilize all cotton seed before planting. All bins and seed houses on farms where seed have been stored should be thoroughly cleaned and all seed which have not been fed should be sold to oil mills for crushing purposes. No seed should be planted from the area under quarantine until it has been sterilized.

The following counties have been placed under this quarantine: Tillman, Kiowa, Caddo, Beckham, Washita, Greer, Jackson and Harmon.

The cotton farmer should not be unduly alarmed by the finding of the pink bollworm or the quarantine to prevent the spreading of this pest. The Oklahoma cotton farmer throughout the quarantine area should not reduce his cotton acreage but should cooperate with the federal and state authorities in eradicating the pink bollworm from Oklahoma.

* * *

Oklahoma is roughly divided into three zones as regards the insect control program on cotton. In the eastern part of the state the boll weevil can be expected to occur in damaging numbers in most years and in part of this section in damaging numbers every year. Based on experimental evidence, we recommend two early applications of 3-5-40 (three percent gamma BHC, five percent DDT, 40 percent sulfur) or 20 percent chlorinated camphene plus 40 percent sulfur at the rate of approximately 10 pounds per acre per application. The first application should be made one week after the appearance of the first squares on the plants and the second application a week later. The purpose of these treatments is to destroy the overwintered weevils which have migrated into the cotton fields from hibernation and before they have had an opportunity to lay eggs for the first generation. In some years frequent rains favor the development of bollworms in destructive numbers especially when there is considerable corn growing near cotton. These rains also cause heavy late boll weevil development. Therefore, under these conditions, it is necessary to protect cotton by three more dust applications using the same materials at the rate of 10 to 12 pounds per acre per application. These later applications should be started about July 21 and should be spaced at 5-7 day intervals. They are for the purpose of controlling the bollworms and boll weevil at a critical time in boll production of the plants.

In the western part of the state the boll weevil either does not occur or is not a limiting factor in cotton production. For this section, we recommend two applications of 3-5-40 or 20 percent chlorinated camphene plus 40 percent sulfur at the rate of 10 to 12 pounds per acre per application or a 10 percent DDT dust at the same rate, depending upon availability and comparative costs. These applications should be made to control the bollworm and only under conditions where this pest occurs.

Intermediate between these two sections of the state is another area where the weevil does not occur in injurious numbers early in the season but may, under certain conditions, migrate into the cottonfields in mid-season and cause damage. Since the bollworm is also a problem in this section, we recommend three applications of 3-5-40 or 20 percent chlorinated camphene plus 40 percent sulfur in mid-season beginning about July 30 and spaced at 5-7 day intervals primarily timed to control bollworms.

(For additional information, write C. F. Stiles or F. A. Fenton, Agricultural Extension Service, Oklahoma A. & M. College, Stillwater, Okla.)

Spray Made the Difference Here

COMPARE the plant stunted and deformed by thrips with normal plants that had been sprayed twice with a Toxaphene-DDT mixture.

Control of Insects in—

• South Carolina

Dusts

BHC-DDT:

The best all-around insecticide for cotton insect control in South Carolina is a dust mixture containing three percent gamma benzene hexachloride (hereafter called BHC) plus five percent DDT in an inert carrier.

It will control the boll weevil, bollworm, cotton aphid, thrip, cotton leaf-

worm, cotton fleahopper and other closely related injurious insects.

An average of at least 10 pounds per acre per application of this material is recommended for the control of all cotton insects except where a build-up of either bollworms or aphids is noted. In such a case, one or more applications of 15 pounds per acre will serve as a "knock-out" dusting.

Toxaphene:

A dust containing 20 percent toxaphene will control the boll weevil, bollworm, cotton fleahopper, thrip, cotton leafworm and will suppress the cotton aphid when this material is used throughout the season.

If toxaphene is used, applications should average at least 10 pounds per acre per application.

Chlordane-DDT:

The 10 percent chlordane plus five percent DDT dust is effective against the boll weevil, bollworm, cotton fleahopper, thrip and cotton leafworm. As a rule it will hold down cotton aphid populations, but will not control them when heavy infestations occur.

High temperatures seem to reduce the effectiveness of chlordane. The results obtained with this material when used on a comparable dosage basis per acre against boll weevils were not equal to results received with other recommended materials for cotton insect control.

Sulfur:

None of the above mentioned insecticides will control the red spider mite, therefore, one or more applications of 20 pounds of dusting sulfur per acre should be used in case of a build-up of this pest.

Sprays

The insecticides mentioned above for dust applications were used experimentally as sprays in 1949.

These sprays gave cotton insect control and yields equal to dust applications. We do not have enough experimental data to justify making a general recommendation for their use during 1950.

For farmers who wish to use spray applications the following information is given.

Spray formulations of emulsifiable concentrates which have given favorable results are as follows:

(1) **Toxaphene** at the rate of two pounds of technical toxaphene per acre;

(2) **Toxaphene - DDT** at the rate of two pounds of technical toxaphene and one pound of technical DDT per acre;

(3) **BHC - DDT** at the rate of .3 pound of technical gamma BHC and one-half pound of technical DDT per acre.

(4) **Chlordane-DDT** at the rate of one pound of technical chlordane and one-half pound of technical DDT per acre.

Farmers planning on using sprays are advised to consult with their county agent in regard to the proper mixing of these emulsifiable concentrates with water.

The sprays for each insecticide should be used at the rate of from three to five gallons per acre per application for the early season sprayings and from five to 10 gallons per acre per application for additional sprayings.

When to Start Applications

The number of applications which the farmer intends to use will indicate the schedule of poisoning to be followed. Usually five or six applications are necessary for complete seasonal control; however, under extreme conditions a greater or lesser number of applications may be needed, depending, of course, on the infestation present.

Research information indicates that where only three applications are to be made, the first one should be made as soon as the first squares are seen, and subsequent applications then made at seven day intervals. The life history of the boll weevil and fruiting habits of the cotton plant indicate that continuity of poisoning applications is essential. Any particular schedule of applications will not be suitable to all situations. Local insect infestations, stage of development of the cotton plant and weather conditions are vital factors in fixing these schedules of poisoning on any farm and, therefore, the individual farmer should gain a fuller knowledge of his own cotton insect problems.

Pre-Square Control:

Data from experiments in 1949 on the control of thirps indicates that pre-square dusting, or spraying with low gallonage equipment, may be profitable. The spraying may be done while cultivating.

Pre-Bloom or Early-Season Control:

In areas where boll weevils cause damage every year, three early season applications of poison, starting as soon as the first squares are seen, is recommended. These applications should be spaced one week apart. They will destroy many of the over-wintering weevils, protect the early set of bolls and delay the normal weevil build-up.

■ **INSECTICIDES must take their place in the cotton production program on the same level as the plow, fertilizer, seed, the cost of chopping out, and every other cost.—Ernest Hart, president, National Agricultural Chemicals Association.**

Mid-Season Control:

When the boll weevils are puncturing 10 percent or more of the squares, applications should be made at five-day intervals until the infestation is brought under control. This usually requires at least three applications. The infestations should be carefully checked, however, following the third application as additional treatments may be necessary.

Protection of Young Bolls During Migration or Late-Season Control:

If climatic conditions during mid-season are favorable for rapid boll weevil development, late season control may pay greater dividends than that applied at any other period. This may be a necessary supplement to either early or mid-season control. When boll weevils are numerous in any field and the plant is in a vigorous growing condition, three applications should be made at four-day intervals.

Equipment

The use of insecticides on cotton is not recommended unless some acceptable type of dusting or spraying machinery is employed for its application.

A rotary hand duster will care for five acres of cotton. A two-row, animal-drawn, traction duster will be adequate for 20 to 30 acres. Larger acreages can best be cared for by tractors or airplanes.

Airplanes should not attempt to cover a swath greater than their wing span.

A two- to six-row low gallonage sprayer, mounted on a tractor, has been found satisfactory for cotton spraying.

Equipment in which 2,4-D has been used cannot be used for spraying cotton.

Do not use tobacco sprayers that will allow the spray to drift onto the operator. See "Precautions."

Bug-catching machines are not recommended as a means of controlling cotton insects.

General

(1) The application of insecticides aids but does not replace good production practices. These are especially essential for profitable cotton production under boll weevil conditions.

(2) A heavy dew is not essential for satisfactory dusting conditions but *the atmosphere must be calm.* Dusting conditions are usually best during the hours of from 5 p.m. to 9 a.m. Do not dust if wind is over three miles per hour.

(3) Sprays should be applied only when the plants are dry. Do not spray cotton that is wet with dew or rain.

(4) Sprays can be effectively applied in winds up to 10 miles per hour.

(5) Sprays should be applied only with mechanical equipment that prevents the spray drift from coming in contact with the operator.

(6) If rain occurs within 24 hours after poisoning, repeat application within 48 hours.

(7) A report of a state-wide survey is available showing yields of lint cotton per acre in relationship to number of applications and kinds of poisons used.

(8) A simple and accurate method of making an infestation count is to walk diagonally across the field, picking 100 squares at random from the top, middle and lower branches. The number of punctured squares found gives the percentage infestation. Count both egg laying and feeding punctures as punctured squares. If the field is extra large or if conditions vary greatly within the field, it is desirable to take more than one sample of 100 squares.

Safeguarding Beneficial Forms of Life

Insecticides destroy beneficial as well as injurious insects. Care should be exercised to avoid poisoning honey bees through careless use of insecticides.

Nearby beekeepers should be notified before poison applications are made whenever possible.

Certain of these materials are also highly toxic to various forms of aquatic life. It is especially necesary to use minimum amounts in cases where there would be an unavoidable drift to ponds and streams. The same precautions should be followed in avoiding pollution of streams and farm ponds stocked with fish.

(The above recommendations and suggestions for cotton insect control in South Carolina during 1950 are approved by the following: W. C. Nettles, leader, Extension Entomology and Plant Disease Work; F. F. Bondy, Entomologist, (USDA) Pee Dee Experiment Station; R. L. Walker, Entomologist, (USDA) Pee Dee Experiment Station; M. D. Farrar, Entomologist, S. C. Experiment Station; J. G. Watts, Entomologist, Edisto Experiment Station; L. M. Sparks, Jr., Extension Specialist, Cotton Insects and Diseases.)

Control of Insects in—

• Tennessee

Experience in the past does not warrant a general recommendation for dusting cotton in Tennessee but a program should be aimed at specific insects when they occur. It is difficult to predict insect outbreaks, hence the grower must familiarize himself with the common pests and apply poisons when infestations justify dusting. During the past few years, however, insect damage has been of enough importance to lead to the conclusion that plans should be made for 1950 in anticipation of similar outbreaks.

Boll Weevils

Boll weevils that were of such severe intensity in most of the cotton areas and in certain parts of Tennessee did not develop in time to do much damage over the great part of the state although a few were found in practically every county where there was cotton. Our dusting program must make provisions for boll weevil control but cannot be based primarily on this pest. It is very important to recognize boll weevil damage early in the season in order to prevent build-up. It may be possible to detect small areas and use spot dusting to advantage.

To determine when boll weevils are present in sufficient numbers to warrant, dusting counts are made of infested squares. This is done by walking through a field and gathering squares at random. A diagonal path across the patch covering most of the field gives a good sample. Squares are not selected on the basis of flaring and fallen squares are not gathered—the plan is to get a representative sample of all squares in the patch. Gather 100 squares and count egg laying punctures which are generally towards the base of the developing square and slightly raised which is in contrast to the feeding punctures that tend to be towards the top and show evidence of insect feeding. When 10 percent of the squares show egg laying punctures it is evident that there is a serious boll weevil attack and poisoning should begin at once. There are several factors that may operate to change the situation such as real hot weather but with an infestation this heavy immediate poisoning is advisable.

The materials recommended this year for boll weevil control are: (1) toxaphene 20 percent dust at the rate of 10 to 15 pounds per acre or (2) three percent gamma BHC; five percent DDT; 40 percent sulfur which is commonly called the 3-5-40 mixture. This is likewise applied at the rate of 10 to 15 pounds per acre. Calcium arsenate may be substituted.

Applications should be made at four to five day intervals until the boll weevil population is practically destroyed. This may require three applications but where there are frequent rains even this may not suffice. Later in the season weevils may migrate and if the population becomes heavy (15-20 percent) dusting may again be necessary.

Do Not Confuse All Small Brown Insects With Boll Weevils. Every year we find different species of small insects on cotton that do no appreciable damage but are mistaken for boll weevils. If you don't know boll weevils see your county

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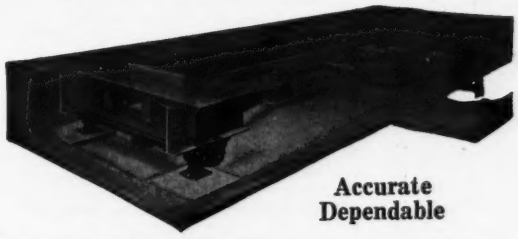

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Aphids, Thrips, and Flea Beetles

These insects attack young cotton plants soon after they emerge, and cause much more damage than is generally realized. The same materials suggested for boll weevils above may be used. Toxaphene will prevent aphid build-up if applied early but does not control heavy infestations. BHC alone (six percent gamma) will give excellent control of aphids.

Tarnished and Rapid Plant Bugs

These insects that resemble stink bugs have been observed in Tennessee for the past several years. Being sucking insects they do not cause conspicuous damage but reduce yields greatly. Either toxaphene or the 3-5-40 mixture gives good control when used at the rate of 10 pounds per acre.

Red Spiders

Several things cause symptoms that may be confused with red spiders but if definitely established that red spiders are present they may be held in check with applications of sulfur either alone or included with the organic insecticides. The 3-5-40 mixture includes sulfur.

Other Pests

Leafhoppers, grasshoppers, cut worms, army worms, leaf worms and others may cause damage but either toxaphene or the 3-5-40 dust will give control. Toxaphene is preferred, however, for army worms and grasshoppers.

Spraying

Last year several growers used liquid concentrate insecticides with success, applied from air and ground. The method looks promising. Details should be worked out for individual equipment on the basis of local need.

Bug Catchers

Mechanical bug catching machines are not recommended.

(For additional information, write J. O. Andes, Extension Specialist in Plant Pathology and Entomology, Agricultural Extension Service, University of Tennessee, Knoxville, Tenn.)

Control of Insects in —

• Texas

Recommended Control Measures

Dust mixtures containing 20 percent toxaphene plus 40 percent sulfur or 3-5-40 mixture[1] applied at the proper time will effectively control the boll weevil, bollworm, fleahopper and thrips, when these occur alone or in combination. They will also either suppress or control aphids and red spiders. Spray mixtures containing toxaphene or toxaphene plus DDT (2-1) are equally effective as dust mixtures for early season control. In 1949 results of tests indicated that these sprays were equally effective as dusts in late season for bollworm and boll weevil control until weevil migration. During weevil migration sprays may be used but in some cases dusts were more effective for boll weevil control.

1. **Early Season Control** insures early fruiting in areas where thrips, aphids, fleahoppers or boll weevils, alone or in combination, cause damage every year. It is more effective if large areas are treated. Two or three applications should be made at approximately seven-day intervals beginning at chopping time. The last application should be made not later than the appearance of the first bloom and at least 30 days before bollworms usually appear. Avoid treatment during this interval if possible, as insecticides applied during this period may produce an increased infestation of boll worms. Severe infestations of fleahoppers, boll weevil or bollworm may occur later in the season, requiring the use of insecticides as recommended in the table.

2. **Late Season Control** depends upon the severity of the infestation and should be followed as needed. Applications of insecticides should be made as indicated in the table.

Pink Bollworm

Cultural practices including regulated dates for planting and destruction of stalks as specified by the State Department of Agriculture remain the most effective means of combating the pink bollworm. Dusts containing two percent gamma BHC, 10 percent DDT and 40 percent sulfur at 15 pounds per acre are a supplemental method of control for this insect. Sprays containing 1½ pounds toxaphene plus 1½ pounds DDT per acre are also effective. The Extension Service urges the support of Pink Bollworm Regulations.

General

1. Dust applications should be made when the air is calm or nearly so. The presence of dew is not necessary. Repeat application if washed off within 24 hours.

2. Spray applications may be made any time of the day when winds do not exceed 15 to 20 miles per hour. For early season treatment with ground equipment one nozzle per row is sufficient. As the plants increase in size the number of nozzles should be increased to a maximum of three. Sprays should be applied at approximately 60 pounds pressure and total volume of two to eight gallons per

Texas Recommendations for Insect Control

Insects	Begin Treatment	Dust Program	Spray Program
		EARLY SEASON CONTROL PROGRAM	
Cutworms and Armyworms	When needed	5% DDT, or 10% toxaphene, or 5% chlordane at 20 lbs. per acre	Toxaphene, or 2-1 mixture[1], or DDT, at 1-2 lbs. per acre
Boll Weevil, Thrips, Aphid, Fleahopper	At usual chopping time	20% toxaphene-40% sulfur or 3-5-40 mixture[2] at 7-10 lbs. per acre, 7-day intervals	Toxaphene or 2-1 mixture[1], ¾-1½ lbs. per acre at 7-day intervals
		LATE SEASON CONTROL PROGRAM—Treat as needed	
Boll Weevil	25 to 35% infestation	20% toxaphene-40% sulfur or 3-5-40 mixture[2] at 10 to 15 lbs. per acre or calcium arsenate 7-10 lbs. per acre at 5-day intervals	Toxaphene or 2-1 mixture[1], 2-3 lbs. per acre at 5-day intervals
Fleahopper	25 to 35 per 100 terminals	5% DDT-75% sulfur or 10% toxaphene-40% sulfur at 10 lbs. per acre at 7-10 day intervals	Toxaphene or DDT or 2-1 mixture[1], ¾ lbs. per acre at 7-10 day intervals
Bollworm	When eggs and 4 or 5 worms are found per 100 terminals	20% toxaphene-40% sulfur or 3-5-40 mixture[2] or calcium arsenate at 10-15 lbs. per acre, or 2-10-40 mixture[3] at 15-20 lbs per acre at 5-day intervals	Toxaphene or 2-1 mixture[1], 2-3 lbs. per acre at 5 day intervals
Leafworm	When worms first appear	Same as boll weevil	Same as boll weevil
Aphid	When honey-dew first appears	3-5-40 mixture[2]—10 to 15 lbs. per acre for "knockout"	40% TEPP—½ pint per acre[4] for "knockout"
Red Spider	When leaves begin to turn yellow or rusty brown	Sulfur—20 to 25 lbs. per acre as needed	Same as for aphid
Lygus and Rapid Plant Bug	When damaging infestation appears	Same as fleahopper	Same as fleahopper
Stink Bugs	When damaging infestation appears	20% toxaphene-40% sulfur, or 3-5-40 mixture[2] or 2-10-40 mixture[3] at 10-15 lbs. per acre at 7-day intervals	Toxaphene or DDT or 2-1 mixture[1], 2-3 lbs. per acre at 7-day intervals
Grasshoppers	When damaging infestation appears	20% toxaphene-40% sulfur or 3-5-40 mixture[2] or 10% chlordane-sulphur, 15-20 lbs. per acre	Toxaphene or chlordane, 1½-3 lbs. per acre

[1]A spray concentrate containing 2 parts toxaphene and 1 part DDT.
[2]Three percent gamma benzene hexachloride, five percent DDT, 40 percent sulfur.
[3]Two percent gamma BHC, 10 percent DDT, 40 percent sulfur.
[4]TEPP may be used in combination with other sprays for aphid "knockout." It is highly toxic to man and other higher animals and should be used with extreme care.

(Note: All recommendations are based upon results of experiments conducted by the Texas Agricultural Experiment Station, A. & M. College of Texas, and the Bureau of Entomology and Plant Quarantine, USDA.)

acre. As a safety measure, it is recommended that the spray booms be mounted on the rear of the tractor.

3. Both ground machines and airplanes are effective for applying poison. When airplanes are used, be sure that the swaths meet or overlap. For best results, it is essential to flag the swath width for airplane applications of insecticides.

4. Plowing under cotton stalks immediately after harvest and before the first frost in the fall has proven to be a very valuable means of reducing the boll weevil population entering cotton fields the next spring. Early stalk destruction forces the boll weevil into a starvation period before entering winter quarters, thus limiting the possibilities of survival through the winter months. Stalk destruction also prevents a build-up of late weevils which have a better possibility of surviving the winter months. Early destruction of stalks by individual growers is worth while; however, community-wide or county-wide destruction is still better.

(For additional information contact your County Agent or Experiment Station.)

Federal Recommendations

(Continued from Page 60)

Little is known regarding possible ill effects on plants from accumulations of chlordane in soils.

See Hazards and Precautions in the Use of Insecticides, page 53.

• **DDT**—DDT will control the bollworm, pink bollworm, tarnished plant bug, rapid plant bug, cotton fleahopper and thrips. It will not control the boll weevil, cotton leafworm, red spider mites, cotton aphid and grasshoppers.

In general, DDT is used as a dust for cotton insect control at concentrations of not less than five percent or more than 10 percent, either alone or in admixture with other insecticides, and at rates of 10 to 15 pounds per acre. Bollworm and pink bollworm infestations require the higher rates of application, but the lower concentrations and rates are effective for other insects named. DDT failed to control thrips at temperatures above 90 degrees F. Emulsion sprays containing two pounds of DDT applied at the rate of 7½ gallons per acre gave promising control of the bollworm.

DDT often increases aphid populations to a point where severe damage may occur unless some aphidicide is included. Following the use of DDT as a dust or spray, either alone or in combination, bollworm infestations sometimes occur after treatments are discontinued.

Either sulfur, pyrophyllite, neutral talcs and clays, or other neutral or slightly acid materials may be used in the formulation of DDT mixtures. Alkaline diluents should not be used. DDT is compatible with all synthetic organic insecticides.

DDT is toxic to certain plants such as cucurbits and, if used in excessive quantities, accumulations in the soil may become toxic to others, especially in light sandy soils lacking humus.

In applying DDT, contamination of adjacent crops from drift should be avoided.

Parasites and predators of insect pests are, in general, susceptible to DDT, and biological control is seriously impaired following its use.

DDT is highly toxic to fish and amphibians, and precautions should be taken to avoid the possibility of stream pollution.

Acute toxicity of DDT to man and animals is rather low as compared with the inorganic insecticides now in use on cotton. However, when DDT is repeatedly ingested or brought into contact with the skin it is absorbed and may be stored in the fatty tissues. Injury to liver may also result. Unnecessary exposure of operators should therefore be guarded against.

See Hazards and Precautions in the Use of Insecticides, page 53.

• **Dieldrin (Compound 497)** — Dieldrin, the product known as Julius Hyman compound 497, was tested against cotton insects in laboratory and extensive field experiments during the 1949 season only. It was highly effective against the boll weevil in either dust or spray formulations at the rate of 0.25 pound per acre. At this dosage it also controlled the cotton fleahopper, tarnished plant bug, rapid plant bug, fall armyworm, variegated cutworm and thrips.

Somewhat higher dosages appear to be required for some other cotton insects. Laboratory tests with third-instar bollworm larvae indicate that 0.5 pound of the technical material per acre may be required for satisfactory control. In field experiments against light to medium bollworm infestations, 0.4 to 0.5 pound per acre appeared to be satisfactory.

In laboratory tests, 0.5 pound of dieldrin per acre gave satisfactory control of the cotton leafworm, tobacco budworm and salt-marsh caterpillar.

Dieldrin is not effective against the garden webworm, cotton aphid and a red spider mite, *Septanychus* sp. Increased infestations of aphids and red spiders have followed its use in field applications.

On the basis of a single year's results, dieldrin is a very promising organic insecticide for boll weevil control. It was found to kill a larger proportion of the weevils developing in squares than any of the other insecticides tested to date. It should be extensively tested by federal and state agencies under experimental field conditions in 1950.

Dieldrin is highly toxic to mammals. It is readily absorbed through the skin. Skin toxicity is comparable to that of parathion and, since toxic effects may be delayed for several days, extreme precautions should be exercised when handling or applying dieldrin.

See Hazards and Precautions in the Use of Insecticides, page 53.

• **Ditolyl Trichloroethane**—In laboratory tests, ditolyl trichloroethane was less effective than DDT against the cotton fleahopper, and less effective than toxaphene against the cotton leafworm. Dust concentrations of five to 20 percent were ineffective against the boll weevil, bollworm, cotton aphid, garden webworm, salt-marsh caterpillar and variegated cutworm.

• **Heptachlor**—Laboratory and field tests with heptachlor indicate that it has possibilities in cotton insect control and deserves further field evaluation. Under laboratory conditions a dust containing 2.5 percent of heptachlor compared favorably with a dust containing 20 percent of toxaphene against adult boll weevils, and in addition killed 100 percent of the weevils developing inside of punctured squares.

In similar tests heptachlor was effective against the variegated cutworm and the salt-marsh caterpillar at concentrations of between 2.5 and five percent in dust mixtures. It is not outstandingly effective against the bollworm, cotton leafworm, garden webworm, cotton aphid or red spider mites.

See Hazards and Precautions in the Use of Insecticides, page 53.

• **Lindane**—Lindane has been selected as the common name for the essentially pure gamma isomer of benzene hexachloride. A spray containing 0.3 pound of lindane with 1.5 pounds of DDT applied at weekly intervals gave good pink bollworm control and promising results against the boll weevil.

See Hazards and Precautions in the Use of Insecticides, page 53.

• **Methoxychlor** — Dusts containing 10 percent of methoxychlor controlled the cotton leafworm, but lower concentrations gave poor control.

Methoxychlor gave slightly better pink bollworm control than DDT, but a heavy build-up of aphids usually followed its use and it failed to control pink bollworms. For these reasons it is not being generally used for pink bollworm control.

Methoxychlor is less effective than the insecticides now recommended for the control of the boll weevil, bollworm, cotton aphid, garden webworm, red spider mites and stink bugs.

Toxicological studies indicate that methoxychlor is less toxic than DDT to warm-blooded animals.

See Hazards and Precautions in the Use of Insecticides, page 53.

• **Nicotine**—Two percent nicotine in alternate applications of calcium arsenate (the period between nicotine applications not to exceed eight to 10 days) if properly applied will usually prevent a cotton aphid build-up.

Either two or three percent nicotine in a suitable carrier can be used to "knock out" heavy aphid infestations. At least 0.2 of a pound per acre of free nicotine equivalent should be applied. The source may be either nicotine sulphate or a fixed nicotine in dust form.

Applications of nicotine dust to "knock out" heavy aphid infestations should be applied when the air is calm and preferably when there is no dew on the plants. Complete coverage is essential.

Nicotine is highly toxic to man and animals and should be used with proper precautions.

See Hazards and Precautions in the Use of Insecticides, page 53.

• **Parathion**—Parathion will control the cotton aphid, red spider mites, garden webworm and some species of thrips. It gives very little control of the boll weevil, bollworm and pink bollworm.

Parathion is an extremely dangerous poison and is not recommended for use on cotton in 1950 except where trained personnel or other individuals are in position to assume full responsibility and to enforce proper precautions as prescribed by the manufacturers.

See Hazards and Precautions in the Use of Insecticides, page 53.

• **Sabadilla**—Sabadilla dust at 10 percent strength has been found to be effective against the leaf-footed plant bugs. However, it has little residual action and is disagreeable to use. Since there are other more effective materials the use of sabadilla as a cotton insecticide is very limited.

• **Sulfur**—Sulfur has been widely used on cotton for control of red spider mites

and the cotton fleahopper. When used in dust mixtures it sometimes has a repressive effect upon aphid populations in some areas. Where red spider mites are likely to be a serious problem, 40 percent or more of sulfur should be included in organic insecticide dusts used on cotton to prevent the development of damaging mite infestations. Properly conditioned sulfur may be used as a diluent for other insecticides when a non-alkaline or an acid carrier is desirable.

• **Tetraethyl Pyrophosphate (TEPP)** — Tetraethyl pyrophosphate, commonly referred to as TEPP, is highly effective as a spray against the cotton aphid. Experiments indicate that applications containing one-half pint of 40 percent tetraethyl pyrophosphate, or its equivalent, per acre effectively control heavy aphid populations. Sprays containing tetraethyl pyrophosphate are known to be effective against the cotton fleahopper, thrips and certain spider mites, and should be further tested.

Tetraethyl pyrophosphate is highly toxic to warm-blooded animals; therefore, it should be used with extreme care. It deteriorates very rapidly when exposed to moisture or moist air and is incompatible with alkaline materials. The residual toxicity of this chemical is very short.

See Hazards and Precautions in the Use of Insecticides, page 53.

• **Toxaphene** — Toxaphene, called "chlorinated camphene" in the report of the Baton Rouge Conference (1948), will control the boll weevil, bollworm, fall armyworm, cotton fleahopper, thrips, cotton leafworm and grasshoppers. Two to three pounds of the technical material per acre, used either as a dust or spray, will satisfactorily control all these pests. Thrips and cotton fleahoppers may be controlled with as little as one-half pound of the technical material per acre.

Where toxaphene was used throughout the season satisfactory suppression of the cotton aphid resulted. It will not, however, control heavy aphid infestations. It will not control red spider mites and its use may result in their increase; therefore, in some areas it is recommended that the dust contain at least 40 percent of sulfur.

Inherent difficulties are encountered in making satisfactory dusts and emulsion concentrates with toxaphene. Processors and mixers are therefore urged to place on the market only formulations suitable for agricultural use.

No economic injury to cotton has been reported from the use of toxaphene. This material can be handled with relative safety to the operator, if proper precautions are taken. Toxaphene is toxic to livestock and poultry and is very toxic to fish.

See Hazards and Precautions in the Use of Insecticides, page 53.

Cultural Practices to Aid in the Control of Cotton Insects

Certain cultural practices reduce cotton losses from insect pests and may eliminate and often reduce the need for the use of insecticides. Several of the following practices may be used by any cotton grower. Others are applicable to certain areas and conditions only. Growers should, in addition to the following practices, continue to make careful observations for insects and apply insecticides when needed.

• **Planting** — Reasonably early planting of cotton during a short, uniform period enables the crop to produce maximum growth and fruit before insects multiply and spread from field to field.

• **Varieties**—Prolific varieties of cotton that fruit early and mature quickly may set a crop before the boll weevil and other insects become numerous, especially if other cultural controls are used.

• **Soil Improvement**—Practices, such as fertilization, rotation of crops and plowing under green manure, tend to offset insect loses. More injury from insects without yield reduction can be tolerated by rapid-growing cotton in rich soil than by cotton growing in poor soil.

• **Other Host Crops of Cotton Pests** — Cotton fields should be located as far as is practicable from other host plants of thrips. Thrips breed in onions, potatoes, carrots and some other crops and later move in great numbers into adjacent or interplanted cotton.

• **Hibernation Areas**—Boll weevils hibernate during the winter in protected areas in and near cotton fields. Clean cultivation to reduce weevil hibernation quarters and planting of winter cover crops to improve the soil and prevent erosion are recommended. Small patches of weeds near fields or along turnrows and fences, or scattered weeds in the cultivated fields or pastures, can be destroyed at a small cost. Such practices are more effective where the cotton acreages are in sizeable blocks rather than in small patches.

• **Early Stalk Destruction**—The destruction or killing of cotton plants by either mechanical or chemical methods, as early as possible before the first killing frost, forces boll weevils into starvation before they go into winter quarters. The result of early stalk destruction, especially over community- or county-wide areas, has greatly reduced the boll weevil problem in the Lower Rio Grande Valley and in other parts of Texas.

Bug-Catching Machines

Bug-catching machines are not recommended as a means of controlling cotton insects.

Chemical Defoliation of Cotton as an Aid to Insect Control

Defoliation of cotton with chemicals has a direct relation to cotton insect control. Defoliation of the cotton has been found to cause boll weevils to leave such fields almost immediately. It also reduces the percentage of locks infested by weevils. Damage to open cotton by heavy aphid populations and late cotton leafworm infestations have been prevented by chemical defoliation.

Proper defoliation checks the growth of the cotton plant and accelerates opening of the bolls. The crop may thus be harvested earlier thereby permitting earlier destruction of the stalks. Where cotton has been defoliated, a much smaller number of weevils were found the following spring. Defoliants can be applied with the equipment that is used for applying insecticides. For best results the cotton plant should be in the first rest period when the defoliant is applied.

Where soil fertility is high or insect control insufficient, cotton plants are rarely in condition for complete defoliation. Further investigations are needed to determine the relationship of chemical defoliation to more effective cotton insect control.

The search for defoliants should be continued especially for one suitable to the arid west and the southwest for use in connection with pink bollworm control. Time of application of defoliants in relation to crop development and other factors should be further investigated.

Cotton Insects

• **Boll Weevil**—The boll weevil, *Anthonomus grandis,* Boh., may be effectively

Spray Got Weevils Here

BOLL WEEVILS had moved from hibernation into this field. Spray was applied in an 18-m.p.h. wind, while dusting machines on the plantation were forced into idleness.

controlled with benzene hexachloride, calcium arsenate or toxaphene. Benzene hexachloride should be applied at the rate of not less than 0.3 pound of gamma isomer per acre, calcium arsenate at the rate of seven to 10 pounds per acre and toxaphene at the rate of two to three pounds of the technical material per acre. When these insecticides are used for boll weevil control under field conditions, other insect problems have to be considered. Complications involving the cotton aphid, bollworm and red spider mites may develop when some of these insecticides are used alone at low dosages for boll weevil control.

Dust formulations recommended for general use include the following: (1) benzene hexachloride (three percent gamma isomer)-five percent DDT mixture; (2) calcium arsenate applied alternately with calcium arsenate-two percent nicotine; (3) calcium arsenate applied alternately with benzene hexachloride (three percent gamma isomer)-five percent DDT; (4) benzene hexachloride (two percent gamma isomer) in special low-lime calcium arsenate in alternate applications with calcium arsenate; and (5) 20 percent toxaphene. Dust mixtures containing 10 percent of chlordane and five percent of DDT are recommended only in areas where they have given good control. In some areas these mixtures have given erratic results, perhaps due to high temperatures and humidity.

In areas where red spider mites are a factor, dust formulations of organic insecticides should contain at least 40 percent of sulfur.

Spray formulations of emulsifiable concentrates which have given favorable results and which are recommended are: (1) toxaphene at the rate of two to three pounds of the technical material per acre; and (2) toxaphene and DDT mixture at the rate of one to two pounds of technical toxaphene and 0.5 to one pound of technical DDT per acre.

Control measures directed against the boll weevil should be applied when definite need is indicated. Except where early season control measures are practiced, insecticides should be applied at intervals of four to five days until the infestation is brought under control. Thereafter, the fields should be inspected weekly and subsequent applications made when necessary.

• **Bollworm** — Serious outbreaks of the bollworm, *Heliothis armigera* (Hbn.), on cotton occur periodically in most states of the Cotton Belt. Causes of outbreaks are complex, some of them being as follows:

1. Changes in cropping systems. Increased acreage of the crops which are hosts of the bollworm, such as alfalfa, grain sorghums and soybeans, are being grown. At times these crops may serve as hosts to increase bollworm populations, while at other times they may act as trap crops, depending on the time of planting, dates of maturity of the crop and seasonal variations.
2. Insecticides. Low populations of natural enemies of bollworms resulting from the use of some insecticides allow outbreaks to develop.
3. Climatic conditions.

The bollworm may be controlled with dusts containing 10 percent of DDT, five percent of DDT plus benzene hexachloride (three percent gamma isomer), 10 percent of DDT plus benzene hexachloride (two percent gamma isomer) or 20 percent of toxaphene. Calcium arsenate,

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1629 MAIN STREET FORT WORTH

lead arsenate and cryolite dusts are less effective. Whenever red spider mite control is also necessary, any mixture containing organic insecticides should include at least 40 percent of sulfur. All dusts should be applied at the rate of 10 to 15 pounds per acre at each application, the amount depending upon weather conditions, the intensity of the infestation and size of the cotton. Applications should begin when eggs and four or five small bollworms per 100 terminals are found, and should be continued at five-day intervals until the infestation is brought under control.

During 1949, sprays containing toxaphene applied at the rate of two to three pounds per acre and a mixture containing two pounds of toxaphene and one pound of DDT per acre gave promising control of the bollworm. The sprays were applied at a pressure of 60 pounds per square inch and at the rate of seven gallons per acre, using three nozzles per row.

Successful control of the bollworm is dependent upon *timeliness of application* and *thorough coverage* of the cotton plant throughout the period of injurious infestation.

• **Cotton Aphid**—Heavy infestations of the cotton aphid, *Aphis gossypii* Glov., often occur on cotton following the use of certain insecticides to control the boll weevil or some other insects. The aphid infestation is also sometimes severe on seedling cotton.

The following insecticides and combinations are recommended because they are relatively safe to use and will prevent an aphid build-up when properly applied:

1. Two percent of nicotine in alternate applications applied at the rate of 10 to 12 pounds per acre.
2. Mixtures containing benzene hexachloride (one-third pound of the gamma isomer per acre) in every application.
3. Benzene hexachloride (two percent gamma isomer) in alternate applications with calcium arsenate.
4. Toxaphene at the rate of two pounds of the technical material per acre in every application.

The following materials are recommended to control heavy infestations of aphids:

1. Benzene hexachloride applied at the rate of one-half pound of the gamma isomer per acre.
2. Three percent of nicotine in a suitable carrier applied at the rate of 10 pounds per acre.

Other insecticides which are effective against the cotton aphid, but which are considered too toxic to be recommended generally, include:

1. One percent of parathion in every application of neutral calcium arsenate to prevent aphid build-up, or one percent of parathion in an inert carrier as a "clean-up."
2. One-half pint of 40 percent tetraethyl pyrophosphate or its equivalent per acre as a "knock-out" measure.

• **Cotton Fleahopper** — The cotton fleahopper, *Psallus seriatus* (Reut.), can be controlled with the following dusts: 10 percent of toxaphene, five percent of DDT plus 75 percent of sulfur, benzene hexachloride (one percent gamma isomer), or two percent of chlordane. When red spider mites are likely to be a serious problem, 40 percent or more of sulfur should be added to organic insecticide formulations. Less effective control of the cotton fleahopper may be obtained with sulfur alone or with a 2:1 mixture of sulfur-calcium arsenate.

In field experiments conducted during 1949, 0.5 pound of DDT, one pound of toxaphene or 0.5 pound of toxaphene plus 0.25 pound of DDT per acre, applied as low gallonage sprays, gave good control of the cotton fleahopper.

In some instances infestations of the cotton aphid develop following the use of DDT dust or spray.

Tetraethyl pyrophosphate at the rate of 0.2 pound per acre gave good control of the cotton fleahopper. However, due to its toxicity, this material is not recommended for general use.

• **Cotton Leafworm** — The cotton leafworm, *Alabama argillacea* (Hbn.), has been controlled successfully for many years by calcium arsenate, paris green or lead arsenate. Dust and spray formulations of benzene hexachloride, toxaphene, a mixture of benzene hexachloride and DDT, or a mixture of toxaphene and DDT, are effective in controlling the cotton leafworm.

• **Cutworms** — Cutworm outbreaks may develop in weeds or crops, especially legumes. Cutworms migrate to adjacent cotton or attack cotton planted on land previously in weeds or legumes.

Recommended control measures are thorough seed-bed preparation and use of poison-bran bait. Allow at least three weeks to elapse between the time of plowing under an infested area and the subsequent seeding of the cotton crop. Poison-bran baits containing paris green, sodium fluosilicate or toxaphene have been found satisfactory. A poison bait consisting of 40 percent of cryolite and citrus meal gives effective control.

Tests have shown that a dust containing 10 percent of DDT, applied at the rate of 10 pounds per acre, or a spray containing two pounds of toxaphene, is effective against the variegated cutworm, *Peridroma margaritosa* (Haw.), and the granulate cutworm, *Feltia subterranea* (F.).

In limited field tests toxaphene at the rate of two pounds per acre controlled the yellow-striped armyworm, *Prodenia ornithogalli* Guen.

• **Fall Armyworm**—The fall armyworm, *Laphygma frugiperda* (A. & S.), occasionally occurs in sufficient numbers to damage cotton. Dusts containing 20 percent of toxaphene, benzene hexachloride (three percent gamma isomer)-five percent of DDT-40 percent of sulfur, 10 percent of chlordane, or 10 and 20 percent of DDT have given good control. Five percent DDT will control small worms. These insecticides should be applied at the rate of 20 pounds per acre. The results obtained from the above materials have varied in different states, therefore local recommendations are advisable.

• **Garden Webworm**—The garden webworm, *Loxostege similalis* (Guen.), may be controlled on cotton by dusts containing five percent of DDT plus benzene hexachloride (three percent gamma isomer), 20 percent of toxaphene or 10 percent of DDT. DDT has given better control in sprays than in dusts and is generally less effective than the other two materials. Calcium arsenate may also be used to control the garden webworm, but heavy poundages are required and control is generally less satisfactory than with the new organic insecticides.

• **Grasshoppers** — Sprays or dusts containing chlordane, toxaphene or benzene hexachloride are rapidly replacing poison baits for grasshopper control in many areas. This is particularly true where grasshoppers must be controlled on lush or dense vegetation.

Benzene hexachloride sprays and dusts usually produce a spectacular kill of the hoppers in a few hours, but results have been erratic and residual effectiveness is limited to one or two days. Chlordane and toxaphene are very effective but are slower in their action. They remain residually effective for five to 14 days, however, depending on prevailing environmental conditions.

Dosages usually recommended to control grasshoppers fall within the following ranges:

Benzene hexachloride, gamma isomer	0.3-0.5 pound per acre
Chlordane	0.5-1.5 pounds per acre
Toxaphene	1.0-2.5 pounds per acre

The lowest dosage rates suggested are effective against newly hatched to half-grown hoppers. The dosage should be increased as the grasshoppers mature or when the materials are applied on partly defoliated plants or on plants that are unpalatable to the insects.

Baits made according to state and federal recommendations still have a place in grasshopper control where treatment of extensive areas is required, particularly in sparse vegetation.

• **Pink Bollworm**—Methods of controlling the pink bollworm, *Pectinophera gossypiella* (Saund.), include destruction of cotton stalks immediately following the harvest, heat treatment of cottonseed, burning of gin waste, compression of lint and the application of dust and spray formulations. In South Texas pink bollworm infestations early in any season are in proportion to the number of these insects which survive the period between crops. The longer this period the fewer insects will survive; therefore, the number of overwintering insects may be reduced by destroying cotton stalks at the earliest possible date. The best procedure is to first cut the stalks with a stalk cutter which crushes them to the ground. If the operation is carried out sufficiently early a high mortality of pink bollworms and other cotton insects results from exposure to heat of the sun. The roots should be plowed out promptly and the crop debris plowed under. All seedlings or sprouted cotton plants developing after the plowing should be eliminated before fruiting so as to create a long host-free period between crops. For best results cultural practices should be carried out on an area-wide basis and the cooperation of every cotton grower is needed. It is a matter of record that cultural practices used to control the pink bollworm will also control the boll weevil.

Cotton growers of the Lower Rio Grande Valley of Texas have used the cultural control as outlined above and, over a four-year period, lint production averaged 313 pounds per acre. Over a 10-year period prior to the beginning of this method of control by early stalk destruction lint production there averaged 208 pounds per acre. It is recognized that the increased production resulted largely from boll weevil control and greater productivity of the soil because of improved farming methods. This increase in production during the four-year period amounted to an addi-

tional 445,000 bales of cotton with a gross value of $76,000,000.

There is a progressive build-up in the pink bollworm population as the season advances; therefore, every effort should be made to expedite fruiting and setting the crop. The following practices are recommended for hastening the maturity of the cotton and thereby reducing the pink bollworm infestation: heat or chemical treatment of planting seed; early uniform planting of quick maturing varieties; control of the cotton fleahopper, thrips, aphids and other insects that delay fruiting; clean cultivation; elimination of late irrigation; and chemical defoliation.

In cold, arid regions, such as the West Texas area, where the harvest must be completed after frost, as many bolls as possible should be removed by snapping, mechanical harvesting or by heavy pasturing. The cotton stalks should be left standing during the winter months, since the highest mortality of hibernating pink bollworm larvae in such areas is obtained in the bolls on standing stalks. Where the stalks are plowed under early in the winter the fields should be winter irrigated as this practice will also reduce pink bollworm survival.

Larvae of the pink bollworm enter mature cotton seeds to feed and to hibernate. To prevent overwintering or spread of the insect, cottonseed are given a heat treatment as a continuous process of ginning in most pink bollworm quarantined areas. In the other areas, cottonseed are heat treated upon arrival at designated oil mills or other treating plants. In the heavily infested areas a second heat treatment is required before movement into other quarantined or free areas. In all pink bollworm quarantined areas gin waste is destroyed promptly by burning, or heat treated for use as a fertilizer, and all lint is compressed before it is moved into areas that are free of pink bollworms.

DDT continues to be the best insecticide for control of the pink bollworm. It can be applied either as a dust or as a spray in a water emulsion. At least 1.5 pounds of the technical material should be used per acre in each application, and the interval between treatments should not exceed seven days.

Dust formulations should contain not less than 10 percent of DDT and should be applied at the rate of 15 pounds per acre. The cotton plants should be thoroughly covered with the insecticide and where airplane dusters are used the swaths should cover approximately 40 feet. Airplanes should not fly more than eight feet above the cotton for most effective application of insecticides. A low volume tractor sprayer is the most satisfactory means of applying the DDT spray formulations. Not less than five gallons of the emulsion should be used per acre in each application and the nozzles should be adjusted so as to obtain good coverage of the plants. Experiments are being conducted to determine the efficiency of concentrated spray applications with airplanes as compared with dust applications.

Aphids and red spider mites may develop when DDT is used alone for pink bollworm control and it is therefore advisable to incorporate other insecticides in the dust formulations to control these pests. The best formulation is a mixture containing 10 percent of DDT, benzene hexachloride (two percent gamma isomer), 40 percent of sulfur, and a good conditioner such as pyrophyllite or inert clay. In the presence of a heavy boll weevil infestation it may be necessary to increase the gamma isomer content of the benzene hexachloride to three percent. Toxaphene can be incorporated with the DDT spray for boll weevil control and it likewise suppresses the build-up of aphids.

• **Red Spider Mites**—At least five species of red spider mites are known to attack cotton. These species apparently vary somewhat in their susceptibility to different insecticides.

Sulfur at the rate of 20 pounds per acre or one percent of DN-phenol at the rate of 10 pounds per acre has been effective against red spider mites under certain conditions. However, it has been reported that a strain of red spider mite has developed which is resistant to sulfur. Notwithstanding the variable results obtained, sulfur is perhaps the most effective insecticide which may be safely recommended to control red spider mites on cotton. In areas where these pests are a factor, dust mixtures of organic insecticides used against other cotton insects should contain at least 40 percent of sulfur to retard red spider increase.

Parathion used experimentally has controlled red spider mites to a very high degree.

In laboratory tests, four percent of compound 88 R (*β*-chloroethyl-*β*-(p. tert. butyl phenoxy)-*0*(-methyl ethyl sulfite), applied at the rate of 10 pounds per acre, has shown promise against red spider mites. Before any recommendations concerning its use are made, this material should be thoroughly tested under field conditions.

• **Tarnished Plant Bug and Rapid Plant Bug** — The tarnished plant bug, *Lygus oblineatus* (Say), and the rapid plant bug, *Adelphocoris rapidus* (Say), sometimes cause injury to cotton, but these insects have received comparatively little attention during recent years.

The organic insecticides ordinarily recommended for cotton insect control are effective against these plant bugs. These include: five percent DDT; a mixture containing five percent of DDT, benzene hexachloride (three percent gamma isomer), and 40 percent of sulfur; and 20 percent toxaphene. Sprays recommended for control of the cotton fleahopper or the boll weevil are expected to control these plant bugs.

• **Thrips**—Thrips are probably more destructive to seedling cotton than has previously been considered. They have also caused serious damage to fruiting cotton at times. Stands of young cotton are frequently lost or impaired because of thrips, or the plants damaged to such an extent that growth and fruiting may be delayed for some time. Although losses in yield may not occur in all cases, the delay in fruiting may result in a lower price, higher picking costs and more chances of the crop being damaged by other insects, wind or rain.

Thrips may be controlled by one-half to one pound of toxaphene per acre, applied in either dust or spray form. A spray mixture consisting of two-thirds of a pound of toxaphene and one-third of a pound of DDT per acre, or a dust mixture containing five percent of DDT and benzene hexachloride (one percent gamma isomer) applied at the rate of 12 to 15 pounds per acre, is also effective.

• **Tobacco Budworm** — The tobacco budworm, *Heliothis virescens* (F.), was reported infesting cotton in many localities in the Cotton Belt during 1949. The injury it caused was similar to that of the bollworm. Little evidence is available as to the amount of injury caused by this species in relation to that caused by the bollworm. More information is needed on life history, host plant preferences, seasonal and geographical distribution and susceptibility of the tobacco budworm to the more commonly used insecticides. DDT as recommended for the bollworm may be used to control this insect on cotton.

• **White-Fringed Beetles** — The white-fringed beetles, *Graphognathus leucoloma*, (Boh.), G. *peregrinus* (Buch.), and *G. minor* (Buch.), which are pests of cotton and many other farm crops, are known to be present in limited areas of Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina and Tennessee.

Larvae of the white-fringed beetles damage cotton by feeding on the roots of young plants. These insects can be controlled by the use of good cultural practices and insecticides. Good cultural practices recommended include the following:

1. Planting of oats and other small grains in heavily-infested areas.
2. Restrict planting of summer legumes, such as peanuts, soybeans, velvet beans or other favorable host plants of the adult beetles to not more than one-fourth of the total crop land. These crops should not be produced on the same land more often than once in three or four years.
3. Do not intercrop corn with peanuts, soybeans, crotalaria or velvet beans. Prevent the growth of broadleaved weeds, such as cocklebur and sicklepod.
4. Improve poorer soils by turning under winter cover crops.

DDT is effective as a soil insecticide for control of white-fringed beetle larvae. Apply 50 percent DDT at the rate of 20 pounds per acre or 25 percent DDT at the rate of 40 pounds per acre evenly to the soil surface as a dust, spray or mixed with sand, and then thoroughly mix it into the upper three or four inches of soil. DDT may be used in the drill before planting. Use 50 percent DDT at the rate of five to 10 pounds per acre or 25 percent DDT at the rate of 10 to 20 pounds per acre, mixed with sand. This may be applied by hand or by a fertilizer distributor, at or slightly below the depth of seed planting.

• **Wireworms**—Several species of wireworms are associated with cotton. Perhaps the most noticeable damage is caused by the sand wireworm, *Horistonotus uhlerii* Horn., in South Carolina, Louisiana and Arkansas. Adults of the tobacco wireworm (spotted click beetle), *Conoderus vespertinus* (F.), are frequently found on the cotton plant, but the amount of damage caused by the larvae of this species is not known.

Approved crop rotation practices, increased soil fertility and added humus help to reduce damage to cotton caused by the sand wireworm. Chlordane, DDT, lindane and benzene hexachloride have shown promise in the control of this and other species of wireworms on other crops. Additional research on the control of wireworms attacking cotton is needed.

• **Miscellaneous Insects**—Cabbage looper, *Trichoplusia ni* (Hbn.): The cab-

(Continued on Page 84)

• Georgia Expands Its

Cotton Improvement Committee

All branches of industry as well as other businesses are brought into state-wide organization which plans program based on county level.

About 65 representatives of the Georgia cotton industry and other organizations "with an interest in the 1950 cotton crop" met in Macon Jan. 31 to enlarge the Georgia State Cotton Improvement Committee to include members from all agricultural agencies and business, industrial and professional groups as well as the state and federal cotton agronomists who made up the original committee set up several years ago when the state's One-Variety Cotton Improvement Program was inaugurated.

W. J. Estes, Haralson, cotton producer, merchant, ginner, buyer and seed cotton handler, was elected chairman of the expanded committee. E. C. Attaway, Cochran, Bleckly county agent, was named vice-chairman and E. C. Westbrook, Athens, Georgia Agricultural Extension Service agronomist who had served as chairman of the original committee since its organization in 1931, was chosen secretary.

Plans call for setting up a 12-member executive committee representing the extension service, experiment stations and major business groups. County agents will be urged to set up county cotton improvement committees and to organize their programs on the county level, with a leading farmer as head of each county group and the county agent serving as secretary.

W. S. Brown, extension service director, Athens, explained the purpose of the Macon meeting at the beginning of the morning session. Other speakers included S. V. Stacy, agronomist, Georgia Agricultural Experiment Station, Experiment, who talked on "Cotton Mechanization," and S. A. Parham, agronomist, Coastal Plain Experiment Station, Tifton, whose topic was "Cotton Fertilization."

"Cotton Insect Control" was discussed by C. M. Beckham, entomologist, Experiment. J. H. Turner, Jr., cotton breeder at the Coastal Plain station, talked on "Care in Harvesting," and Kenneth Treanor, extension economist in farm management, Athens, spoke on "The Agricultural Outlook." After a luncheon the committee was reorganized and a cotton program and plan of action adopted.

A recording of the meeting made by R. D. Stephens, head of the extension service radio department, was broadcast on the Dixie Farm and Home Hour on Station WSB Feb. 2. Taking part in the transcribed program were J. T. Preston, Monroe, president of the Georgia Cottonseed Crushers Asociation; C. E. Carroll, Dublin, president, Georgia Cotton Ginner's Association; Fred Barnes, vice-president, Bibb Manufacturing Co., representing textile manufacturers; Mr. Attaway, representing county agents; and Mr. Brown.

Represented at the Macon meeting were the extension service, experiment stations, vocational agriculture, USDA, crushers' and ginners' associations, bankers' association, cotton manufacturers' association, insecticide manufacturers and dealers, fertilizer manufacturers and dealers, agricultural agents of major railroads, Atlantic Cotton Association (cotton merchants), Georgia Warehouse and Compress Association, National Cotton Council, National Cottonseed Products Association and other interested groups.

"It is becoming increasingly evident to all of us who are closely associated with the cotton production program," declared Mr. Westbrook, "that farmers have got to do a better job, they have got to make larger yields per acre, and they have got to produce quality cotton in volume in order to make the kind of progress that is needed.

"The one-variety program naturally fits into this picture nicely. It is the best way we know of producing quality cotton in volume for mills, and it is also the best way to keep the seed pure, and to produce good pure seed in volume at low cost. We expect to make full use of our Five-Acre Cotton Contest. We expect to use these as demonstrations similar to what we have done for the last three years."

STATE-WIDE COTTON PROGRAM planners who met at Macon Jan. 31 to set up an enlarged Georgia Cotton Improvement Committee included: (seated, left to right) W. J. Estes, Haralson, chairman of the state-wide committee; J. T. Preston, Monroe, president, Georgia Cottonseed Crushers Association; (standing) E. C. Attaway, Cochran, Bleckley county agent, vice-chairman of the committee; and E. C. Westbrook, Athens, extension cotton specialist, secretary.

Proceedings of Sesame Conference Available

The latest information on sesame, the oilseed crop which is grown for crushing in many foreign countries and offers much promise for production in the U.S., is now available in the Proceedings of the First International Sesame Conference.

The proceedings may be purchased for $1.50 per copy, postpaid, from J. A. Martin, Department of Horticulture, South Carolina Experiment Station, Clemson, S. C. Checks should be made payable to J. A. Martin.

The 80-page publication contains papers presented at the conference in August 1949 at Clemson. Subjects discussed include research with the crop in South Carolina, at the Texas Research Foundation and at the University of Nebraska; and discussions of research and production of the crop in Venezuela, India and El Salvador.

The nutritional value of sesame, chemical and physical values of sesame oil and protein, certain vitamin values of sesame, and the properties of a solvent-extracted sesame oil are among other subjects discussed by authorities contributing papers to these proceedings.

Brazil's Peanut Acreage Is Down; Cotton Up

The severe and prolonged seasonal drought in Central Brazil last year caused many growers to plant cotton instead of peanuts, USDA reports. Result is that peanut production may not exceed 110,000 short tons in 1950, compared with the official estimate of 153,000 tons in 1949.

Larger cotton acreage will largely offset the loss in peanut acreage and total cottonseed production for the year ending June 30, 1950 is tentatively estimated at approximately 827,000 tons. Production in 1949 was 727,500 tons. Total production of edible vegetable oil in Brazil in 1950 is expected to be slightly under 1949 production.

New Mexico Boy Produces 5 Bales on One Acre

TOM JONES, left, associate Chaves County (N. M.) agent, examines a sample of the five bales of cotton produced on one acre by the winner of the 1517 Cotton Production Contest for 1949. Shown with Jones is John F. Adams, 18, of Hagerman, N. M., the winner of the contest. He won a $500 prize for his record production.

Photo by The Cotton Gin and Oil Mill Press.

C. R. Campbell Joins Continental's Industrial Division

ANNOUNCEMENT was made this week by R. Y. MacIntyre (left in picture), manager of the Industrial Division of Continental Gin Company, Birmingham, Ala., of the appointment of Charles R. Campbell (shown right) of Dallas as district manager of the Industrial Division in the Dallas territory. Mr. Campbell is well known in the Southwest and has had many years of operating and production experience with cottonseed and peanut oil mills and feed plants. For the past few years he has been a consulting engineer in Dallas. Mr. Campbell attended Sewanee and Georgia Tech and is well qualified, through education and experience, for his new connection in the design, sale and manufacture of Continental's conveying, elevating and transmission equipment. He and his family will continue to make their home in Dallas.

USDA-BAE Report on the

Fats and Oils Situation

USDA's Bureau of Agricultural Economics reports that the index number of wholesale prices of 26 major fats and oils (excluding butter) in January was 147 percent of the 1935-39 average, compared with 140 percent in December 1949 and 201 in January 1949. Strong export demand for lard, edible vegetable oils and inedible tallow and grease has been a major factor in the slight upward trend in prices of these items since the lows of November 1949. Also, demand in the domestic market apparently has strengthened in recent months.

However, USDA-BAE says, a major rise in the general level of prices of fats and oils does not appear likely in the next few months. Production of fats and oils will continue at record or near-record levels in the remainder of the 1949-50 crop year, and probably will be large again in 1950-51. The expected increase of about six percent in the 1950 pig crop presages a moderate increase in lard and grease output next fall and winter over the large production in the current season. Also, farmers will replace corn and cotton acreage to some extent with soybeans in 1950. Acreage allotments will not be established for 1950-crop soybeans. Corn acreage allotments, which will be in effect for the first time this year since 1942, call for a reduction of about 11 million acres in the planted acreage. Cotton acreage will be substantially reduced under the acreage allotment and marketing quota program for 1950. With an expanded soybean acreage in 1950, production of soybean oil in 1950-51 may increase enough to offset the decline in cottonseed-oil output that will result from reduction in cotton acreages.

Exports of fats, oils and oil equivalent of oilseeds in November 1949 totaled 194 million pounds, including shipments to U.S. territories. This was the highest since July and was 84 percent higher than in November 1948, but was well under the unusually high monthly average in January-July 1949. The total for January-November 1949 was 2,139 million pounds compared with 834 million pounds a year earlier. Leading items in the first 11 months of 1949 were 558 million pounds of lard, 551 million pounds of soybean oil and oil equivalent of soybeans, 394 million pounds of inedible tallow and greases, 197 million pounds of peanut oil and oil equivalent of peanuts for crushing abroad and 107 million pounds of cottonseed oil.

Imports of fats and oils in November were larger than for any other month since December 1948. Total imports in January-November 1949, including oil equivalent of oilseeds, was 1,014 million pounds compared with 1,103 million pounds a year earlier. Leading items (all in terms of oil) in the first 11 months of 1949 were 498 million pounds of copra, 109 million pounds of coconut oil, 109 million pounds of castor beans and 78 million pounds of palm oil. Large purchases of coconut and palm oils by the Munitions Board for stockpiling have contributed to the import demand for these commodities.

• *New Project Will*

Hasten Sesame Research

Clemson College and Rio Farms, in Lower Rio Grande Valley of Texas, cooperate in a new project to permit the growing of two sesame crops in a single season. The work will be done under the supervision of the Educational Service of the National Cottonseed Products Association.

AN IMPORTANT development in the program to make sesame a commercial oilseed crop for cotton-growing states is reported by the Educational Service of the National Cottonseed Products Association.

This is an arrangement made to hasten research on a nonshattering type of sesame which can be harvested mechanically and produced for crushing.

In order to shorten the time required for research, the National Association, Clemson Agricultural College and Rio Farms, Inc., in the Lower Rio Grande Valley of Texas, have completed the following plan:

J. A. Martin, horticulturist of Clemson College, South Carolina, has gone to the Valley to plant 10 acres of breeding seed on Rio Farms. Grown under the supervision of Mr. Martin and Dr. Lawrence C. Curtis, agronomist of the Educational Service, this planting will supplement those at Clemson College later in the year, and permit the growing of two crops in a single season.

Suitability of Rio Farms for this planting was demonstrated last fall when a sesame crop planted in September matured during November. An accompanying picture shows F. Earl Davis, a director of the National Association from Harlingen, and J. R. Padget, manager of the Rio Farms demonstration farm, inspecting this 1949 trial planting of shattering sesame.

"With the marked progress that already has been made toward developing nonshattering sesame, and this cooperation between Clemson College and Rio Farms, it is hoped that by 1952 a nonshattering sesame will be available for planting and mechanical harvesting," says A. L. Ward, director of the Educational Service.

"We know that further research will be needed after that to improve yields and varieties and increase the oil content of the seed, but we believe that the present high oil content of sesame will permit it to compete with other oilseed crops for crushing."

Sesame, which is widely grown and crushed in Mexico, the Orient and other foreign countries, produces oil of excellent quality; and the protein meal is comparable in value to other vegetable protein meals for livestock feeding.

Shattering of the seed has been the crop's weakness which has prevented commercial production in the U.S. For the past three years, the National Cottonseed Products Association has been coperating with sesame research at Clemson College and the Texas Research Foundation. This program is under the supervision of the association's Production Research Committee, composed of E. H. Lawton, Hartsville, S. C.; W. F. Guinee, New Orleans; and W. L. Weber, Taft, Texas.

Trial plantings of a shattering type of sesame by local oil mills and farmers in most of the cotton-growing states during 1949 revealed that the crop does well at widely-scattered locations, and under varying weather and soil conditions. As a farm crop, sesame can be planted and cultivated with the equipment now on most cotton farms; and can be harvested with row binders and combines.

Trial plantings of sesame and okra by farmers will not be necessary in 1950 from the standpoint of the research program, the Educational Service announces, although any farmer is free to experiment with the crops. Farmers should realize, however, that small lots of seed from such trials are not likely to find a market.

It's Good Business To Sell Stauffer Cotton Dusts

Take advantage of the natural tie-in sales by stocking and selling this complete line of Stauffer Cotton Dusts. There's a Stauffer dust or combination of dusts recommended for the most efficient and economical control of all the major cotton insects.

STAUFFER COTTON DUSTS

Stauffer Cotton Dust No. 122
Contains 3% Gamma BHC — 5% DDT — 57% Sulphur

Stauffer Cotton Dust No. 82
Contains 20% Toxaphene and 47% Sulphur

Stauffer Cotton Dust No. 22
Contains 5% DDT and 82% Sulphur

Stauffer Cotton Dust No. 22-1
Contains 10% DDT and 75% Sulphur

Stauffer Cotton Dust No. 122-6
Contains 10% DDT, 2% Gamma BHC, and 50% Sulphur

Stauffer Cotton Dust No. 82-1
Contains 10% Toxaphene and 70% Sulphur

Stauffer Emulsifiable Concentrates
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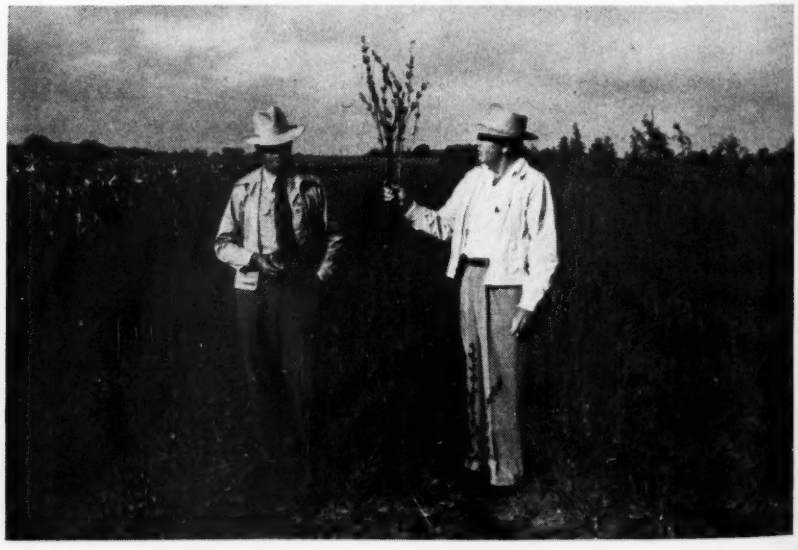
SESAME GROWING in the Lower Rio Grande Valley of Texas is shown below in a picture made last fall. F. Earl Davis of Harlingen, manager of the South Texas Cotton Oil Company mill and a member of the National Cottonseed Products Association board of directors, is holding the sesame stalk. With him is J. R. Padgett, manager of the demonstration farm of Rio Farms, Inc. Arrangements for further sesame seed plantings at Rio Farms are announced in the accompanying article.



Alabama Ginners Reelect All Officers at Meeting

Cotton insect control was the principal subject discussed by speakers at the annual convention of the Alabama Cotton Ginners' Association at Huntsville on Feb. 6. Entomologists from Alabama Polytechnic Institute at Auburn were present to bring the importance of an effective control program to the attention of the ginners.

The suggestion made some time ago that the Alabama association and the Georgia ginners association merge into a single organization was discussed at the convention but no definite action was taken. M. M. Paschall is chairman of a committee appointed to give the matter further study. A number of Georgia ginners were present at the Huntsville meeting.

All officers were reelected to serve another year. They are Judge Sam High, Ashville, president; P. M. Lightfoot, Tuskegee, executive vice-president and treasurer; and Lawrence Ennis, Jr., Auburn, secretary.

D. B. Oliver in Hospital At Raleigh, N. C.

We regret to report that D. B. Oliver, president of the Pine Level Oil Mill Company, Pine Level, N. C., is in Rex Hospital at Raleigh, N. C., suffering from a heart ailment. As we go to press, however, Mr. Oliver is showing improvement and is able to see visitors. He has many friends in the crushing industry and we join them in the hope that he will soon be fully recovered and back on the job at the mill.

Donigan Announces Texas Ginners' Chairmen

Standing committee chairmen and subchairmen of the Texas Cotton Ginners' Association for 1950 have been announced by President H. P. Donigan, Whitewright.

They include: finance—Cleve Tandy, chairman, and Albert A. Bursey; legislative—C. L. Walker, Jr., chairman, and Troy Patrick; insurance—Walter Evans, Jr., chairman, and A. J. Mills; migratory labor—H. A. Pendleton, chairman, and W. C. Nycum; resolutions—G. K. McDonald, chairman, and Otto Pfluger; allied industries—Bert Davenport, chairman, and C. Bando, Jr.; convention—M. R. Teinert, chairman, and J. W. McCann.

Daughter Born to the Harrold B. Joneses

"Just a note to let you know," writes Harrold B. Jones of Memphis, "that the 1971 Maid of Cotton, weighing nine pounds, five ounces, arrived Feb. 13 at Methodist Hospital here in Memphis.

"Mother and baby are doing fine," Harrold says, "and the father is still living. There is one thing we are sure of: the baby is definitely another user of cotton."

Jones is ginning specialist for Tennessee and executive secretary of the Tennessee Cotton Ginners' Association.

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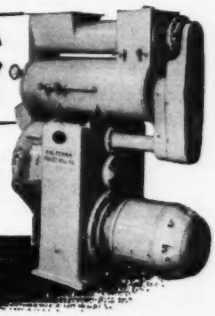

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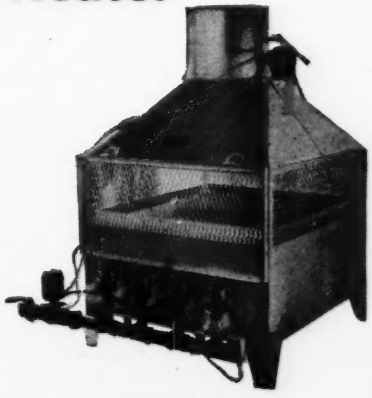

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Oil Mill Equipment for Sale

FOR SALE—Oil mill equipment including Anderson expellers and French screw presses.—Pittock and Associates, Glen Riddle, Pa.

Gin Equipment for Sale

FOR SALE — Two special bargains in the Rio Grande Valley. Low price with liberal terms. Also good 5-70 Murray and 5-80 Gullett, both must sell cheap. Write, call or wire—M. M. Phillips, Box 1288, phone 3-1171 or 3-3914, Corpus Christi, Tex.

BARGAINS—Used and reconditioned equipment—air blast gins: 5-80 saw Lummus "automatic," with lint-flue and condenser. 5-80 saw Gullett direct connected. 4-80 saw Murray steel. 5-70 saw Murray steel. 4-70 saw Cen-Tennial. 2-80 saw Cen-Tennial "Commander." Also 5-80 saw Munger brush gins. Mitchell extracting feeders: Five 58" F.E.C. cast iron ends. Three 66" F.E.C. cast iron ends, like new. Three 60" standard F.E.C. pressed steel. Continental extracting feeders: Three 60" double X. Two 60" triple X. Also one 50" Continental 6-cyl. all steel incline cleaner, like new. One Lummus thermo dryer, with or without boiler. Several excellent power units 80 to 300 hp., including one 150 hp., model JL-1335 Buda, new 1947, used very little. A large stock of machinery in Waco for prompt shipment.—R. B. Strickland & Co., 13-A Hackberry St., Tel. 2-8141, Waco, Texas.

FOR SALE—Four-70 saw Murray air blast gins with 6" mote conveyor, new roll dumping fronts—excellent shape — complete with 4-70 lint flue. Three-80 saw Continental Munger air blast gins—model 30 fronts complete with lint flue. Three-80 saw 66" Mitchell FEC extractor feeders — cast iron ends—flat belt drive. Three 60" Blewett extractor feeders with flat belt drive. One 50" Continental Condenser—all steel up draft. One 50" Continental steel plate fan.—Red River Cotton Oil Company, Inc., P. O. Box 1710, Alexandria, La.

GIN OUTFIT—Five-80 saw Murray steel 6" mote conveyor gins with lint flue and 72" steel condenser. Will sell above separately or complete plant with electric power.—R. B. Strickland & Co., 13-A Hackberry St., Tel. 2-8141, Waco, Texas.

FOR SALE—One Continental all steel 48" condenser with 4-80 lint flue complete for model "C" Continental gin stand.—E. H. Horton Co., Oneonta, Ala.

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We have the following new and reconditioned guaranteed gin motors in stock for immediate delivery—

150 hp. 3/60/2300/1200 rpm., slipring
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150 hp. 3/60/2300/720 rpm., sq. cage
125 hp. 3/60/220-440/1200 rpm., sq. cage
125 hp. 3/60/440/900 rpm., slipring
125 hp. 3/60/2300/900 rpm., sq. cage
100 hp. 3/60/440/900 rpm., sq. cage
100 hp. 3/60/2300/900 rpm., sq. cage
100 hp. 3/60/2200/900 rpm., sq. cage
100 hp. 3/60/440/900 rpm., sq. cage
100 hp. 3/60/440/900 rpm., slipring
100 hp. 3/60/220/900 rpm., sq. cage
75 hp. 3/60/2200/1200 rpm., slipring
75 hp. 3/60/2200/1200 rpm., sq. cage
75 hp. 3/60/440/1200 rpm., sq. cage
75 hp. 3/60/2200/900 rpm., slipring
75 hp. 3/60/2200/900 rpm., sq. cage
75 hp. 3/60/220-440/900 rpm., sq. cage

Call on us—Day or Night—anywhere. Complete starting equipment and drives available for all the above motors. Free rental while we repair your motors.

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W. M. Smith Electric Co.

DALLAS, TEXAS

AUTOMATIC gas heaters delivered and installed in your gin plant. See advertisement on page 81 this issue.—Service Gin Co., P. O. Box 21, Ville Platte, La.

FOR SALE—Murray tramper $150.00, Fairbanks seed scale 150.00, 12 cyl. Stacy cleaner B.B. 300.00, ram and cylinder 150.00, cotton bale scale 35.00, steel split pulley 21" x 42" 25.00, 12" telescope 25.00. Modern gin with or without farm. — H. Melcher, Route 2, New Ulm, Texas.

FOR SALE—Four-80 modern Murray gin plant with dwelling located near southeast Texas coast. Good cotton acreage. A bargain. For further information write Box 1-B, care The Cotton Gin and Oil Mill Press, Box 444, Dallas 1, Texas.

FOR SALE — One good Continental "Paragon" steel bound heavy duty, up packing press. Has steel top and bottom sills, steel end channel, solid center post, weight balanced doors with wheel controlled safety locks. With or without Continental "E-J" Tramper, hydraulic ram and casing and hydraulic pump. Press in Waco stock. Contact us for anything needed for a cotton gin, including tower driers and gas heaters.—R. B. Strickland & Co., 13-A Hackberry St., Tel. 2-8141, Waco, Texas.

FOR SALE — 6-80 saw Continental outfit, complete; with 180 h.p. Fairbanks-Morse oil engine. Look plant over and make an offer, for removal. —Vernon Oil Mill, Box 1950, Vernon, Texas.

FOR SALE—To be moved, complete outfit—three 80 CenTennial gins, Mitchell feeders and Caterpillar power unit. Contact — Frank H. Gorrell, Subiaco, Ark.

EXCELLENT BUY—3-80 saw all steel Gullett gin outfit with down-packing press, multiple extractor feeders, double conveyor distributor, 4-cylinder cleaner over 6-cylinder cleaner with 14-ft. bur machine, 10 shelf tower drier, with new style premix gas burner, seed scales, 2 conveyor lift elevators and Caterpillar D-13000 engine with drive. Contact—M. H. Walker, Route 2, Gaffney, S. C.

FOR SALE—Modern and in excellent condition the following gin plant: Three-80 double moting Lummus gin stands, with glass fronts, super unit Mitchells, Mitchell conveyor-distributor, type "M" all steel dropper, 60" all steel Lummus condensor, Lummus one story press, Butane Mitchell burner and 1130 gallon tank on steel skids with 1949 model Mitchell vaporizer, 100 h.p. Westinghouse electric motor, with all controls, large seed house and gin building in A-1 condition, large platform scales, and sealed office with butane heat. Plant just installed this past season, owner living too far from site, reason for selling. Situated on a three acre lot in Cash Point, Tenn., three miles east Ardmore, Tenn. If interested, see, call or write—Mr. J. B. Augustin, phone 77, Loretto, Tenn.

FOR SALE—One 7 and one 5 cylinder—wood 50 inch Hardwicke-Etter type I cleaner. One 14 ft. wood Hardwicke-Etter bur machine. One 12 shelf tower drier.—Electric Gin, Italy, Texas.

FOR SALE — Three (3) Hardwicke-Etter "new hull extractor cleaner feeder" units used but in good condition. Priced to move.—Turley Brothers, Savage, Miss.

FOR SALE—Five-80 Murray gins and big drum feeders with steel belt distributor, condensor, Murray triplex pump and ram and casing complete, mechanical packer, conveyor, shafting and pulleys. Write—Croisant Cotton Company, Muskogee, Okla.

FOR SALE—Four-80 saw CenTennial gin stands with Mitchell extractor-feeders. Mitchell equipment practically new and gins in perfect condition. Buy this equipment and increase your business.—Cecil E. Carroll, Phone No. 474, Dublin, Ga.

BUILDINGS—All steel buildings for gins, warehouses, cottonseed houses and whatever purpose needed. Send us your needs and let us give you our price.—Marvin R. Mitchell Construction Co., 1220 Rock Island, Dallas, Texas. Phone C-5615.

FOR SALE — Three-80 Cen-Tennial air blast all steel commander gin outfit. Heavy duty swing door press 10" ram powered by 115 h.p. diesel engine, ball bearings throughout. Plant is in A-1 shape. Complete with building to be moved. Located in Georgia. For information write — Box "KZ", care The Cotton Gin and Oil Mill Press, P. O. Box 444, Dallas 1, Texas.

Equipment Wanted

WANTED—Late model bur machine, Tower drier and Mitchell cleaner.—Drew Cotton Seed Oil Mill, Monticello, Ark.

WANTED—Steel up-pack press in good condition. Also late model tramper to handle cotton from 4-80 outfit.—W. E. Phillips, Jr., Pinetops, N. C.

WANTED—Fourteen ft. burr machine 7 to 12 cylinder cleaners, Tower drier complete. Might buy complete gin to be moved if it has the above equipment.—H. H. Schawe Gin, Maxwell, Texas.

WANTED — Bauer Brothers 199 seed cleaner—Drew Cotton Seed Oil Mill, Monticello, Ark.

Power Units and Miscellaneous

FOR SALE—One rebuilt 8" x 9" four cyl. Twin City engine. Sales and service on all sizes of Twin City engines.—Fort Worth Machinery Co., 1123 East Berry, Fort Worth, Texas.

FOR SALE—100 h.p. and 75 h.p. Y-type Fairbanks-Morse engines complete with compressors and clutches. Will run engine for customer if he wishes.—E. H. Segars & Co., Lamar, S. C.

FOR SALE—One P.A.—100 International engine. Equipped to burn natural or butane gas. Good condition $1,000. 78 doz. 1⅛" gummers and 29 doz. 3½" duplex files 70c per doz.—McAlester Oil Mill Co., McAlester, Okla.

FOR SALE—Skinner engine 15 x 15 and 150 h.p. boiler, pumps, heater, piping all good condition for $1200.00.—Joyce Gin, Snyder, Texas.

Council Held Research Clinic Feb. 15-17

Through overall review, pooling of known fact and by frank round-table discussion the National Cotton Council's three day cotton research clinic at Washington Feb. 15-17 went far to set the stage for greatly increased cotton research effort and progress.

The cotton research clinic sessions were attended by more than 50 textile scientists from mills, private and institutional laboratories, textile schools and government agencies. All phases of cotton utilization research were explored.

ECA Authorizations Total $137 Million in 1949

ECA net authorizations in 1949 for the purchase of fats and oils in the U.S. totaled 137.4 million dollars. Net authorizations amounted to 59.8 million dollars in the first quarter of the year, 44 percent of the total for the entire year. In the second quarter, net authorizations dropped to 20.7 million dollars but increased moderately in each of the two following quarters.

• Alfalfa originated in southwest Asia and came to the U.S. by way of South America about 100 years ago.

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Model M12H, Serial 1386-G Tractor Model M-CH

• Bought new in 1948 and used only at Oklahoma Cotton Research Station by Station personnel under supervision of International Harvester Company. Excellent condition, equipped with new-type spindles, and used only over about 200 acres part of 1948 and 1949.

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TEXAS ENGINEERING EXPERIMENT STATION

Cottonseed Oil Solvent Extraction Research is Described in Reprint

Further results of pilot-plant scale research in solvent extraction are available as Reprint No. 7 of the Texas Engineering Experiment Station, College Station. It embodies the article "Isopropanol as a Solvent for Extraction of Cottonseed Oil. II. Separation of Purified Oil from Miscella," which appeared in the December 1949 issue of *The Journal of the American Oil Chemists' Society*. The authors are Dr. W. D. Harris and J. W. Hayward of A. & M. College of Texas, and R. A. Lamb, Baroid Corporation, Lafayette, La.

Experiments have shown that it is possible to extract by solvent process the oil from cottonseed to produce gossypol-free meal of superior value. Reprint No. 7 in the main deals with the miscella produced by this process. The miscella contains the oil, free fatty acids, gossypol and other non-oil materials. Solubility and distribution data have been established for the systems isopropanol-water-cottonseed oil and oleic acid and isopropanol-water-cottonseed oil-oleic acid-hexane.

Using these data as a basis, a liquid-liquid extraction system has been developed which permits the separation of the miscella into a stable purified oil and a mixture of the free fatty acids, gossypol, phospholipids, sugars and other non-oil materials. The process is sufficiently flexible to permit the extraction of cottonseed of variable free fatty acid content to produce a product of controlled uniformity.

The research described in the reprint was conducted by the Chemical Engineering Department of A. & M. College of Texas with funds obtained from the Cotton Research Committee of Texas and the Texas Engineering Experiment Station.

Develop Vitamin Assay Method for Use in Cottonseed Research

Research on a project entitled "A Vitamin Study of the Cottonseed and Its Products" at the Cottonseed Products Research Laboratory, has to date resulted in adaptation and development of an analytical procedure for determination of vitamin E. The method will be used in further phases of the vitamin research at the laboratory.

Prior to the analysis of cottonseed and its products for vitamin E, it has been necessary to develop a method for concentrating and assaying the individual tocopherols present. Although methods have been developed that apply to most products, cottonseed and many of its products present a different type of problem due to the presence of free fatty acids and lower phenols.

Cottonseed products contain alpha-tocopherol and gamma-tocopherol. The resorption sterility test has been generally accepted as a measure of vitamin E activity. Science writings indicate that pure gamma-tocopherol has only one percent the activity of alpha-tocopherol in the resorption sterility test and is therefore neglected when vitamin E is assayed on this basis. The presence of gamma-tocopherol is reported to have a sparing effect on alpha-tocopherol. A biological assay of margarine indicated 10 percent greater vitamin E activity than the chemical assay. When the two tocopherols are compared for vitamin A sparing activity they are of equal activity. A biological assay is not practical in the Cottonseed Products Research Laboratory's experiments due to the toxicity of certain unrefined products of the cottonseed. A chemical assay is most practical considering also the number of samples to be run and the small quantity of each available.

While recognized procedure for the determination of the vitamin E content of foods was used as a basis in development of the method for the determination of the vitamin E content of cottonseed and its products, it was found necessary to change or add certain steps in order to obtain accuracy. The method involved the steps of rolling or grinding, dehydration, extraction, molecular distillation, hydrogenation, colorimetric assay for total tocopherols and colorimetric assay of gamma-tocopherol.

Conclusions of the first phase of the experimentation indicate that the method for the assay of vitamin E, as determined in the laboratory, is applicable to cottonseed and all its products which will be studied under the project. The shorter procedure of rolling or grinding followed by dehydration is entirely satisfactory for cottonseed and its solid products instead of the longer procedure of freezing, dehydrating and grinding that is required for most foods. The short procedure also permits the assay of samples containing lint such as cottonseed. The extraction of the sample with dilute sodium hydroxide (containing pyrogallol) in order to remove phenols and objectionable compounds prior to molecular distillation was found to be essential when working with cottonseed and certain of its products. Experimentation indicates that hydrogenation of the sample prior to the colorimetric assay for total tocopherols might not be necessary. The colorimetric assays as described in the report are entirely satisfactory for samples containing no appreciable amount of beta- or delta-tocopherol as in the case with cottonseed and its products.

The vitamin research study is being conducted by Homer N. Morrow, Jr., assistant research chemist.

Photo by The Cotton Gin and Oil Mill Press.

NCPA Agronomist Is Agricultural Club Speaker

THE COMMON GOURD, which thrives in arid parts of West Texas and other Western areas with as little as two inches of rainfall annually, is potentially an important source of edible oil and protein, the Dallas Agricultural Club was told at its weekly meeting Feb. 13 by Dr. Lawrence C. Curtis, agronomist of the National Cottonseed Products Association and nationally known plant breeder. Doctor Curtis is shown at left in the photo above with Jas. R. Gill of Paris, Texas, president of the National Association.

The NCPA agronomist has made an exhaustive study of the gourd and other cucurbits and demonstrated to his audience, through the use of slides, how the former plant is able to put its roots deep into the soil in search of water, sometimes as far as 45 feet below the surface. Doctor Curtis has found some single plants in West Texas that yielded from 3 to 5 pounds of seed. He estimates that the gourd may be made to yield as much as 1000 pounds of seed per acre.

Since going with the National Cottonseed Products Association, Doctor Curtis has devoted most of his time to the Association's program of adapting sesame and other oilseed crops to Cotton Belt conditions. (See story elsewhere in this issue about a joint NCPA-Clemson College sesame seed breeding project in the Lower Rio Grande Valley of Texas.)

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SWIFT & COMPANY

Federal Recommendations

(Continued from Page 77)

bage looper and several other closely related species occasionally cause damage to cotton in localized areas. Dusts containing five percent of DDT or 10 percent of toxaphene, applied at the rate of 10 pounds per acre, or sprays of toxaphene or DDT as used for thrips control, will give complete control of the cabbage looper.

Corn silk beetle, *Luperodes brunneus* (Crotch): This insect has been reported as a pest of cotton in localized areas in several states. Little is known about this insect.

Cotton root aphids: Three species of root aphids are known to attack cotton. These are: The corn root aphid, *Anuraphis maidi-radicus* (Forbes); *Trifidaphis phaseoli* (Pass.); and *Rhopalosiphum subterraneum* Mason. So far as is known, injury by root aphids to cotton is confined to the Eastern Seaboard. Several species of ants are known to be asociated with root aphids, the principal one being the cornfield ant, *Lasius niger alienus americanus* Emery. Chemical control of root aphids has been directed at control of the cornfield ant by the use of tartar emetic baits. Some of the newer materials are known to be outstandingly effective as soil insecticides for the control of certain subterranean insects and it is suggested that these be tested against root aphids attacking cotton. Root aphids injure cotton chiefly in the seedling stage. Since cotton in this stage often shows signs of injury without any evidence of insects being present, it is suggested that careful examinations be made of the underground portion to determine the possibility of root aphid attack. Ant mounds at the base of seedling cotton plants indicate the presence of root aphids on the roots.

Cotton square borer, *Styrmon melinus* (Hbn.): The cotton square borer occurs throughout the Cotton Belt, but rarely causes economic damage. The injury caused by this insect to squares is often attributed to the bollworm.

Cotton stainer, *Dysdercus suturellus* (H. S.): The cotton stainer occurs within the continental limits of the United States in Florida only. However, probably due to mistaken identity, the literature also records it from Alabama, Georgia and South Carolina. No formal work has been reported in recent years on control, but observations indicate that dusts containing 10 percent of toxaphene or benzene hexachloride (one percent gamma isomer) will control insects of this genus. There are indications that DDT may also be effective in some areas.

Cowpea aphid, *Aphis medicaginis* (Koch): The cowpea aphid occurs commonly on very young cotton, especially on the cotyledonous leaves. Cotton is not believed to be a true host plant of tnis species and the insect will not complete a life cycle on the cotton seedling.

Flea Beetles: These insects are rarely serious pests of cotton. A five percent DDT dust has been found effective.

Grape colaspis, *Colaspis flavida* (Say): Calcium arsenate and DDT have given satisfactory control of this insect on cotton.

Salt-marsh caterpillar, *Estigmene acrea* (Drury): The salt-marsh caterpillar can be controlled by toxaphene, applied as either dust or a spray at the rate of three pounds of the technical material per acre. Laboratory tests indicate that heptachlor, aldrin and dieldrin may also be effective when applied at rates of between 0.5 and one pound per acre. Field tests with these compounds are needed to establish minimum effective dosages under practical conditions.

Insects That Attack Cottonseed in Storage

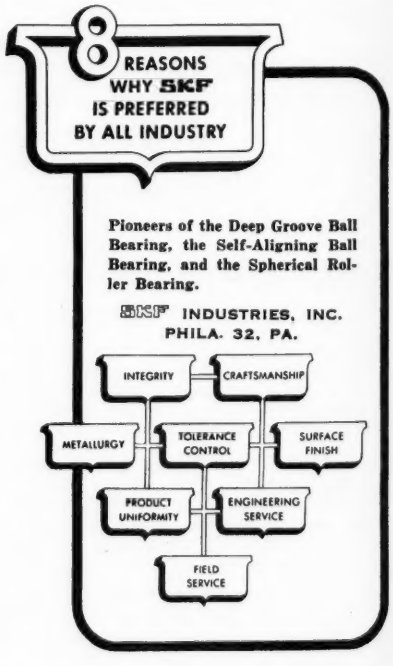
Cottonseed rarely becomes infested with insects while in storage if proper sanitation precautions are followed. Cottonseed or seed cotton should not be placed in a bin or room that has not previously been given a thorough cleaning so as to remove all old cottonseed, grain, hay or other similar products in which insects that attack stored products are likely to develop. Among the insects that have been reported as causing damage to stored cottonseed or to cottonseed meal are the cigarette beetle, *Lasioderma serricorne* (F.), the Mediterranean flour moth, *Ephestia kuhniella* Zell., and the Indian-meal moth, *Plodia interpunctella* (Hbn.). Cottonseed that is to be used for planting only may be dusted with toxaphene before being placed in storage. Seed so treated should not be crushed or used for feed.

Parasites and Predators of Cotton Insects

Parasites and predators aid greatly in the control of insect pests of cotton. However, their help cannot always be relied upon and it is usually necessary to use cultural control practices and to spray or dust the cotton with insecticides. Extensive investigations, which have included the importation and colonization in cotton fields of several insect parasites of the pink bollworm, have shown that so far the use of these natural enemies of cotton insects has limitations.

Cotton Insect Surveys

The results of work done in the past



few years have shown the value of surveys to an over-all cotton insect control program. Surveys were conducted during 1949 in all of the major cotton-growing states except California, Missouri and Tennessee. Cotton insect surveys at present are conducted on a cooperative basis by state and federal agencies. However, more people are being employed each year by business firms, individual farm operators and others interested in cotton production to determine cotton insect populations. It is important that individuals employed by private interests to make surveys understand the control programs as well as how to make infestation counts. Therefore, state and federal entomologists should assist in locating personnel that have at least some basic training in entomology to do survey work for private interests. If this is not done, many growers are sure to be misinformed about recommended control practices.

Information obtained through surveys on insect populations has done much to create interest in cotton insect control programs. When survey data are collected, interpreted and disseminated at weekly intervals, it is helpful to growers, the insecticide industry, entomologists and all others interested in an effective control program. The extent and intensity of the coverage largely determine the value of surveys. Therefore, it is recommended that cotton insect surveys be placed on a permanent basis and that they be expanded to include all cotton-producing states.

Wherever possible, it is desirable to enlist voluntary field observers to increase the volume of reports received during the active season. Wider dissemination of the information that is compiled is highly desirable.

Knoepfler Succeeds Reuther As NCPA Research Fellow

C. G. Reuther, National Cottonseed Products Association research fellow at the Southern Regional Research Laboratory at New Orleans, whose report to the association for 1949 was printed in the Jan. 21 issue, has obtained a civil service status with a P-2 classification and has been transferred to the New Orleans laboratory in a permanent position.

Mr. Reuther will be succeeded as NCPA research fellow by Nestor B. Knoepfler, who has a P-1 classification.

Mr. Knoepfler is a graduate of Tulane University and has one year's experience with the Southern Cotton Oil Co. During the war he entered the Navy where he had considerable experience in the inspection of ordnance material and petroleum products. Later he was stationed in the Marshall and Gilbert area as Atoll fuel officer and was promoted to lieutenant commander.

While he has only one year of fat and oil experience, Mr. Knoepfler knows how to work harmoniously and cooperatively with others. He succeeds Mr. Reuther in the pilot plant operations under the supervision of E. A. Gastrock, chemical engineer at the Southern laboratory.

• During 1946-47, an average of 58 out of every 1,000 farms in the nation changed hands. In 1947-48, the rate had dropped to 49 per 1,000 and during the year ending March 1949, only 41 farms per 1,000 were sold.

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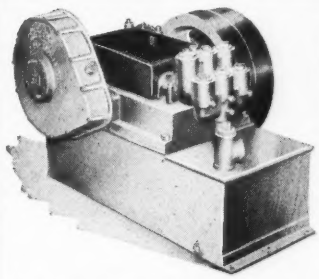

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FERRIS WATSON SEED CO.

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GARLAND (DALLAS COUNTY), TEXAS

EDITORIAL Comment

ROLE OF THE GINNER AND THE CRUSHER IN INSECT CONTROL

■ In his article beginning on page 29 of this special cotton insect control issue Dr. P. N. Annand, chief of USDA's Bureau of Entomology and Plant Quarantine, puts the spotlight on the ginner and the cottonseed crusher by pointing out that he should have an appreciation of the enormous losses cotton insects are capable of inflicting upon the cotton industry, that he should keep in close touch with their distribution and abundance from year to year, and that he should "have a general knowledge of the latest methods and materials available for reducing or preventing losses from those pests that occur in his area."

"Such an understanding on the part of the ginner or cottonseed crusher," Doctor Annand said, "is essential because of his strategic relationship to the cotton growers."

It is almost impossible to overemphasize the key role of ginners and crushers in an insect control program. In many sections of the Belt they have formed a solid front with their state entomologists, the federal entomologists and other workers in helping to put into effect a sound program of insect control on the community and farm level.

Beltwide, a good job is being done by the ginning and crushing industries in insect control, yet there are still many individual members of those industries who still think of it as the farmer's sole responsibility. It may be the farmer's *final* responsibility, but the theory that it is his *solely* is disproved by the fact that in areas where ginners and crushers show little interest in insect control we generally have weak control.

Where insects annually are a menace to the cotton crop, the ginner or the crusher who expects to continue profitable operation must not only familiarize himself with the control recommendations in his own state but he must do everything he can to persuade growers to adopt those recommendations as an integral part of their cotton production program.

Failure on the part of ginners and crushers to recognize their role in our annual battle with insects means lower volume for both. It means higher production costs and lower grades—and it helps to strengthen the competitive position of synthetics and foreign growths. By capitalizing on their opportunity to enter into full partnership with the farmer in increasing his own production and profits, progressive ginners and crushers are helping to assure their own future as members of a sound cotton industry.

BRANNAN PLAN GAINS

■ If it is true that there is nothing new under the sun, then there should be little surprise over reports that a number of conservative Democrats and even some Republicans are casting interested glances in the direction of the Brannan Plan.

The Administration, as can be expected, has all hands busy trying to transform it from a mere plan into an actuality. But reports that middle-of-the-road Congresmen, to say nothing of even more conservative elements, are throwing in with that much-belabored formula for agriculture will still come as a surprise to many who never dreamed it would get a pat on the back by those thought to be its arch enemies.

This just goes to prove that persistence—and Secretary Brannan has it to spare—frequently accomplishes the improbable—and sometimes, even, the impossible.

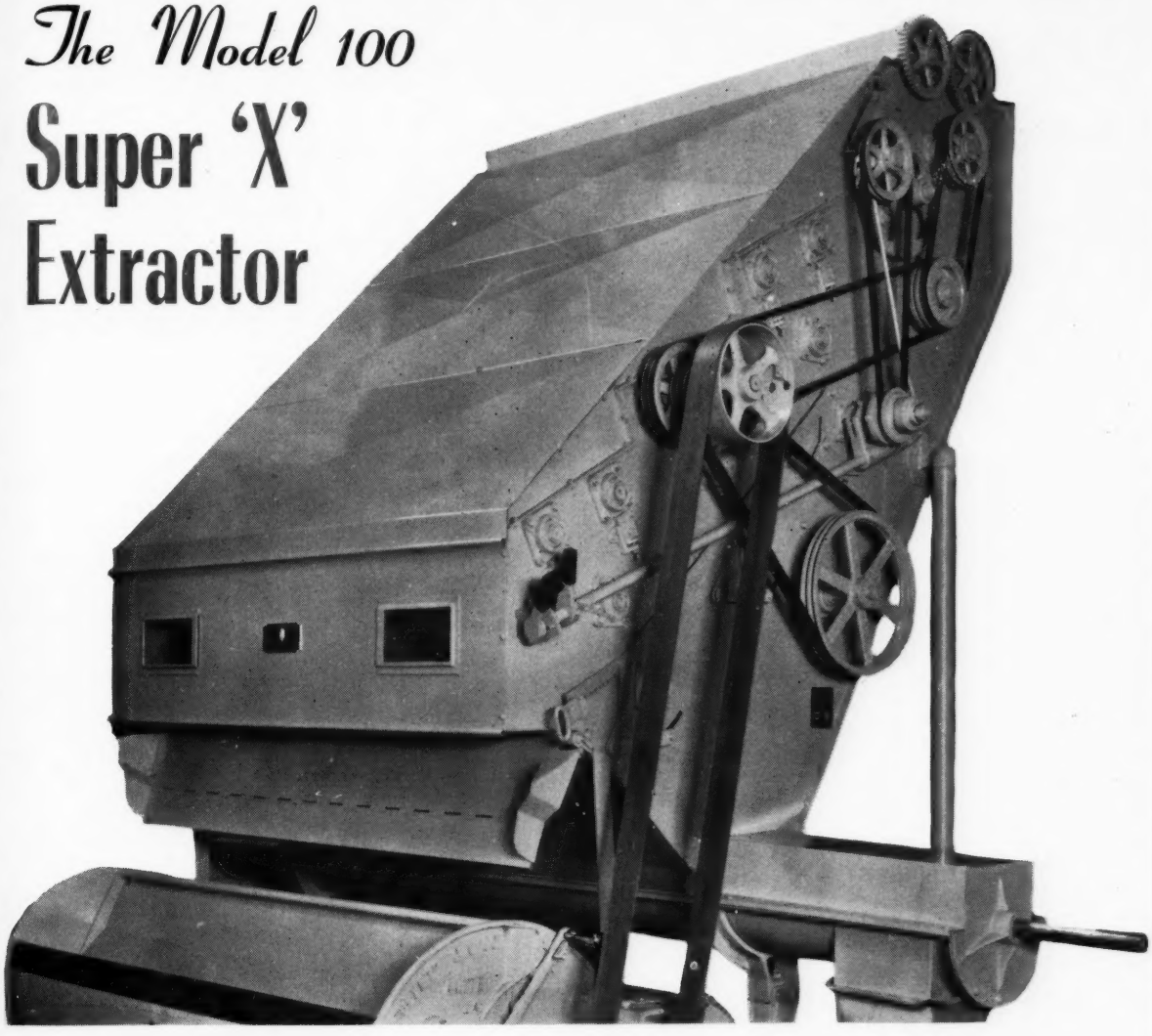
CALENDAR

Conventions • Meetings • Events

- **March 7-8 — Second annual National Agricultural Aviation Conference. Texas Hotel, Fort Worth, Texas.**
- **March 12-13—Georgia Cotton Ginners' Association annual convention. Henry Grady Hotel, Atlanta, Ga. Mrs. Doris H. Balsley, Dublin, Ga., secretary.**
- **March 14-15 — National Cotton Ginners' Association annual meeting. Peabody Hotel, Memphis, Tenn. Carl Trice Williams, Jackson, Tenn., secretary-treasurer.**
- **April 3-4 — Valley Oilseed Processors Association annual convention. Hotel Buena Vista, Biloxi, Miss. C. E. Garner, 1024 Exchange Bldg., Memphis 3, Tenn., secretary.**
- **April 3-4-5 — Texas Cotton Ginners' Association annual convention. Fair Park, Dallas, Texas. Jay C. Stilley, 109 N. Second Ave., Dallas, executive vice-president.**
- **April 14 — Tennessee Cotton Ginners' Association annual meeting. New Southern Hotel, Jackson, Tenn. Harrold B. Jones, 65 Exchange Ave., Memphis, Tenn., executive secretary.**
- **May 12-17—National Cottonseed Products Association annual convention. The Shamrock Hotel, Houston, Texas. S. M. Harmon, Sterick Bldg., Memphis, Tenn., secretary-treasurer.**
- **June 1-2-3—Tri-States Oil Mill Superintendents Association annual convention. Hotel Peabody, Memphis, Tenn. L. E. Roberts, c/o DeSoto Oil Co., Memphis, Tenn., secretary-treasurer.**
- **June 4-5-6 — Oklahoma Cottonseed Crushers' Association annual convention. Artesian Hotel, Sulphur, Okla. Horace Hayden, 1004 Perrine Bldg., Oklahoma City, Okla., secretary-treasurer.**
- **June 5-6 — Alabama-Florida Cottonseed Products Association and Georgia Cottonseed Crushers Association joint annual convention. General Oglethorpe Hotel, Wilmington Island, Savannah, Ga. T. R. Cain, 310 Professional Center Bldg., Montgomery, Ala., executive secretary, Alabama-Florida association; J. E. Moses, 522-3 Grand Theatre Bldg., Atlanta, Ga., secretary-treasurer, Georgia association.**
- **June 5-6—Arkansas-Missouri Ginners Association annual convention, Arlington Hotel, Hot Springs, Ark. J. W. Karsten, Jr., Kennett, Mo., executive vice-president.**
- **June 11-13—Texas Cottonseed Crushers' Association annual convention. Plaza Hotel, San Antonio, Texas. Jack Whetstone, 624 Wilson Bldg., Dallas 1, Texas, secretary.**
- **June 15-16 — Mississippi Cottonseed Crushers Association annual convention. Hotel Buena Vista, Biloxi, Miss. J. A. Rogers, P. O. Box 3581, West Jackson Sta., Jackson, Miss., secretary.**
- **June 19-20 — North Carolina Cottonseed Crushers Association and South Carolina Cotton Seed Crushers' Association joint convention. Ocean Forest Hotel, Myrtle Beach, S. C.**
- **July 27-28—Cotton Research Congress, eleventh annual meeting. Baker Hotel, Dallas, Texas. Sponsor: State-Wide Cotton Committee of Texas, Burris C. Jackson, Hillsboro, Texas, chairman.**
- **September 18-19-20 — Second International Sesame Conference. Maracay, Venezuela. For additional information, write Dr. D. G. Langham, Head, Department of Agronomy and Genetics, Venezuelan Ministry of Agriculture, Maracay, Venezuela.**

The Model 100

Super 'X' Extractor



We are pleased to announce the addition of this great new machine to our fine line of machinery. Developed to meet the increasing demands of the ginners for a machine to remove more of the hulls and stalk stems from cotton.

The performance of this improved design in the field has been outstanding. In one machine we have TRIPLE EXTRACTION with SIX EXTRACTING SAWS with CLEANING before, during and after extraction.

It has all the features a good Extractor-Feeder should have. Quick start and stop feed mechanism. Adjustable stripper rollers. One lever operates hull discharge to wide open, medium or totally closed position. Many other features that every ginner will like.

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HARDWICKE-ETTER SPLIT RIB GIN

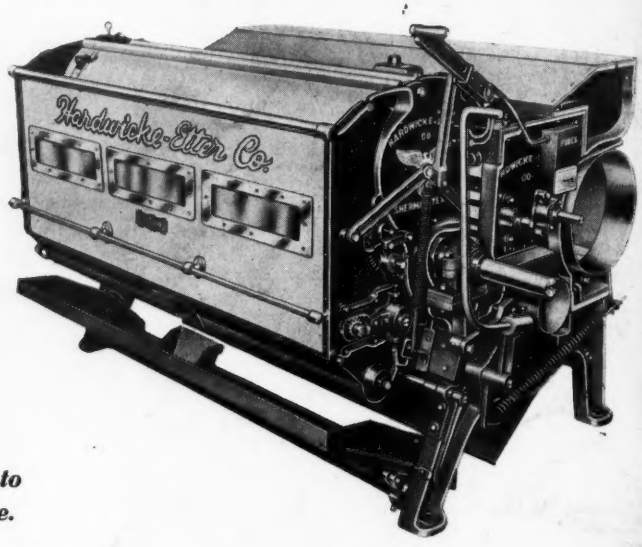
With:

Hot Roll Box for smoother sample

Suction Mote Control for cleaner sample

Split Huller Rib for fiber length protection

And the many fine features built into the gin which are easily adjusted by the operator, to make the finished bale of greater value



Note the sturdy construction to give long, trouble-free service.

HARDWICKE-ETTER COMPANY

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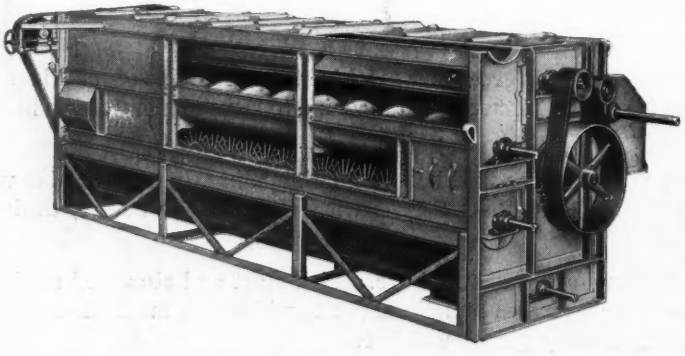
New Big Bur Extractor



EXTRACTION FULL LENGTH OF SAW CYLINDER

Trash discharge or Moting Space extends FULL LENGTH directly under Saw Cylinder. This feature eliminates Cylinder dragging through accumulated trash at this point, and affords maximum capacity without loss of cotton.

Write for Bulletin No. 34-A

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